

The stakeholder value and pedagogical validity
of Industry Certification

A thesis for the partial fulfillment of a Master of Education degree

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2006

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Attestation of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or any other institution of higher learning.

Signed:

Date:

Acknowledgements

I sincerely thank Richard Smith, AUT University School of Education, and Tony Clear, AUT University School of Computer and Information Sciences, for their careful and excellent supervision, providing many relevant references for me to pursue, and pointing me in some useful directions. Thanks also to Anders Berglund, Uppsala University, Sweden, for providing insights into phenomenography and providing some useful suggestions, and David Giles, AUT University School of Education for insights into phenomenology.

I wish to acknowledge and thank the interview participants for giving of their time, and their willing responses to my interview questions, and their frank and insightful comments. Their contribution added significant richness to the research data.

I also wish to thank my family for their support, encouragement, and understanding. I acknowledge and thank the staff of both the AUT School of Education and the AUT School of Computer and Information Sciences for their help and encouragement. I also thank my proofreader, Cat Carruthers.

I further wish to acknowledge and sincerely thank my two examiners. Their consideration and valuable comments have helped improve the final quality of this thesis as well as providing valuable advice for my future work.

Ethics approval for the interviews was granted from AUTEK on 3 April, 2006: Ethics Approval Number 05/246. Appendix A is the Participant Information Sheet; Appendix B is the Participant Consent Form.

Abstract

In December 2004, at the SoDIS[®] (Software Development Impact Statements) symposium in Auckland, an industry certification as a method of credentialing teachers and analysis of SoDIS was mooted. SoDIS, a process of ethics-based risk assessment and analysis of downstream risk to project and software stakeholders, including the public, is currently in the process of progressing from prototype to commercial product. Certification was proposed to ensure the integrity of the process and the quality of service to stakeholders.

Certification sponsored by industry, commercial organisation, or professional association (collectively referred to as industry certification, or certification) has been a form of credentialing for over half a century. Industry certification was adopted by the IT industry when Novell, Inc. began testing and certifying IT industry and IT network professionals in 1986 (Cosgrove, 2004; Novell, 1996). Global certification testing centres were established in 1990 by Drake International (now Thomson Prometric) (Foster, 2005).

During the 1990s, industry certification became a veritable juggernaut: a “multi-billion dollar business” (Cosgrove, 2004, p. 486), an industry that has arisen in its own right (Adelman, 2000) and driven by several dynamics (Hitchcock, 2005). In 2000 there were over 300 discrete IT certifications with approximately 1.6 million individuals holding approximately 2.4 million IT certifications (Adelman, 2000). The total number of available certifications is impossible to quantify (Knapp & Gallery, 2003). Many academic institutions both at tertiary and secondary level are integrating industry certification, especially IT certification, into their curricula.

Is industry certification, however, a pedagogically robust form of credentialing? Does it have value to its stakeholders? Is it an appropriate form of credentialing for the SoDIS process? This research, using both Phenomenography and Interpretive Phenomenological Analysis (IPA) as a joint methodology, focuses on the *experiences* of actors with the phenomenon of industry certification and extracts both the essence of the understanding and perceptions of the value and validity of industry certification, and the essence of industry certification itself.

Due to the vast amount of literature found describing industry actors' perceptions of and experiences within the phenomenon, the research is predominantly literature-based. Further data was collected from interviews with a small, purposive sample of industry certification holders and employers, with the research further informed by my own experiences within the domain which is the focus of the research. The methodology paradigm is interpretive: the research aims to interpret the social construction that is the phenomenon of industry certification.

While this research does not attempt to single out specific industry certifications to determine their value or pedagogical robustness, the findings suggest that, in general, well designed and well administered certifications with integrity and rigour of assessment processes, are indeed pedagogically sound, with significant value. The research identifies both benefit and criticism elements of typical certifications, along with elements of the various certification programmes categorised into standard (typical), and more rigorous (less typical) certification programmes.

The research develops and presents a paradigm for building an appropriate vendor¹ specific or vendor neutral certification programme that is pedagogically sound with value for its stakeholders. The contrasts and complementary aspects of industry certification and academic qualifications are highlighted. It is therefore concluded, and supported by data from the interviews, that such a credential is indeed appropriate for teachers and analysts of SoDIS.

¹ In the context of this research, 'vendor' refers to the product manufacturer/vendor, e.g. Microsoft.

industry 2: a branch of commercial enterprise concerned with output of a specific product (Collins Dictionary and Thesaurus, 1987)

certify 2: to endorse or guarantee that certain required standards have been met (Collins Dictionary and Thesaurus, 1987)

Chapter 1: Introduction to the research

In December 2004, at the SoDIS® (Software Development Impact Statements) symposium in Auckland, an industry certification as a method of credentialing teachers and analysis of SoDIS was mooted. SoDIS, as will be described later, is a process of ethics-based risk assessment and analysis of downstream risk to project and software stakeholders, including the public (Gotterbarn & Clear, 2004). SoDIS is currently in the process of progressing from prototype to commercial product. An industry certification was proposed to credential analysts and teachers of SoDIS to ensure the integrity of the process and the quality of service to stakeholders. As a prerequisite, such a certification must be pedagogically robust, and provide value to its stakeholders.

The research began as a Master of Education Reading paper literature review. Once the extent of the subject in focus became apparent in the Reading paper, I narrowed the focus to advantages, benefits, criticisms, and trends in industry certification. A summary of the resulting paper was subsequently published (see Hitchcock, 2005). The wider subject, the phenomenon referred to here as *industry certification*, then became the subject of the formal research for this Thesis.

1.1 Overview

The purpose of this study is to provide data to:

1. Assess industry certification as a form of pedagogically sound credentialing;
2. Assess that such a credential has value to industry actors who are its stakeholders, namely, the certified community (individuals and their industry or profession) and prospective certification candidates, and those to whom certified individuals provide the services upon which the credential is founded, namely employers and end users or consumers;
3. Strengthen the rigour and overall success of a certification programme as a form of education and credentialing for SoDIS teachers and analysts.

In this chapter I introduce the subject topic of the research and its grounding in the SoDIS methodology. I look briefly at the research methodology and data analysis methods used, and locate myself as the researcher into context with the research. I describe the research audience, and outline the remaining chapters of this thesis. Three “scene setting” personal stories are presented, along with a description of my own relevant background to contextualize this study.

Industry Certification

Gonczi (1992) advocates developing competency in the workforce using recognised pedagogical and educational methodologies. One method of education, training, and qualification that has become predominant in industry over the past decade is *industry-based, professional certification* programmes (industry certification).

Industry certification has become a global industry in its own right (Adelman, 2000; Hitchcock, 2005). Described by Cosgrove (2004) as a “multi-billion dollar business” (p. 486), it keeps expanding, maturing to meet both technological, market, and consumer need: a veritable juggernaut. The forces that drive it derive from several dynamics (Hitchcock, 2005, 2006):

1. Certification candidates seeking to enhance their package of knowledge and skills, and attain higher status and remuneration.
2. The certified professional community who seek to raise the bar of their universal competency levels, and form a communications link between vendors and consumers.
3. Industry seeking to raise the overall knowledge and skill levels within itself.
4. Employers who seek ways to better qualify job candidates’ credentials.
5. Consumers who demand knowledgeable and skilled professionals.
6. Product vendors who demand that highly competent technicians implement and support their products; and professional associations setting minimum standards and advancing their profession.

This research examined and analysed both individual conceptions of industry certification and the phenomenon of industry certification itself based on the experiences and views of actors within the phenomenon recorded in literature.

The research is further informed by data from interviews with certification holders and employers of certification holders, and from my own 10 years experience in industry certification.

An introduction to the methodology and methods of data collection

Marton (2000) posits that research about a phenomenon will reasonably tell us something about that phenomenon. If research enables, first, an understanding of the way industry certification is perceived by and the meanings constructed of it by the actors within it, a sponsor proposing certification will understand the way their certification will be perceived by their target audience, and will be able to design and maintain a credible certification that is accepted and valued. Second, if the phenomenon itself is understood, certification sponsors, by adopting an appropriate, pedagogically sound certification programme, are able to ensure educational and industry validity, integrity, and rigour of their credential.

A joint methodology approach has therefore been adopted. This approach has been taken to, first, understand how participants construct meanings of industry certification, and second, to understand the phenomenon of industry certification itself. The methodology basis for the first view requires phenomenography, as much of the focus of interest is the different ways industry certification actors experience the phenomenon and their resulting belief construction (Booth, 1997; Marton, 1986), thereby extracting *the essential features of the various ways industry certification is understood*. The second view requires Interpretive Phenomenological Analysis (IPA), as the focus of interest is the conscious, intuitive, individual experiences and personal perceptions of actors within the phenomenon, examining the essence of what is experienced (Smith, 1996; Smith, 2003; Wikipedia, 2005a), and extracting *the essential features of industry certification itself*. These methodological approaches, and the rationale for using this joint approach, are outlined in Chapter 3.

Due to the vast amount of literature found describing industry actors' perceptions of and experiences within the phenomenon, it was initially intended that this study be entirely literature-based. The volume of literature

from a wide variety of rich sources provides, in itself, an element of triangulation for data verification, as all of the resulting categories of meaning and their sub-themes were derived from a multiplicity of commentaries. Once the literature analysis was completed, however, it was decided that the interviews with industry certification holders and employers of industry certification holders would further enrich the data and provide further data verification and triangulation. Furthermore, the researcher's own experiences in the phenomenon add supplementary verification, and further triangulate the data. The context of myself as the researcher to this research is discussed further in this chapter in section five.

Being predominantly literature-based, interpretive text analysis methods have been adopted. Interpretive text analysis methods assume that the meaning of text is subjective as the writers' expressions reflect their epoch and circumstances (Lacity & Janson, 2001). As the researcher, therefore, I have taken care to learn more about the writer of each text, taking into account the writers' situations. According to Lee (1994), the meaning of text refers to what the author had in mind, but is not restricted to this. Ricoeur (1981) refers to a text's reference to a surrounding world, and to what is already socially constructed: what the socially constructed world is that stands behind the author's written words. Lee argues that the reader, upon grasping this socially constructed world standing behind the author's meaning, is not therefore independent but becomes an agent of that world and able to identify inconsistencies, and able to transcend the author's own understanding. Ricoeur argues that hermeneutics allows us to differentiate between not merely interpreting and explaining a given text, but interpreting and *understanding*.

The methodology is within the interpretive paradigm. The interpretive world asserts that reality, and our knowledge of reality, are social products (Orlikowski & Baroudi, 1991). The world is conceived as an emerging social process as an extension of subjective experience (Burrell & Morgan, as cited in Orlikowski & Baraoudi, 1991). The interpretive perspective attempts to "understand the intersubjective meanings embedded in social life ... [and hence] to explain why people act the way they do" (Gibbons, 1987, p. 3). An explanation of intersubjective meanings, Gibbons says, leads to greater

understanding. This research aims to interpret and explain the social construction that is the phenomenon of industry certification and hence lead to a greater understanding of the phenomenon.

1.2 Research questions

This study investigates industry certification. It is an interpretive analysis that explores and analyses individual perceptions of and experiences within the industry certification phenomenon. Furthermore, the research provides data to assess the value to stakeholders and the pedagogical robustness and validity of industry certification in order to strengthen the rigour and the overall success of a certification programme as a form of education and credentialing for the SoDIS process.

The questions this research sought to answer, therefore, were:

- 1 How is industry certification a valid, reliable, and pedagogically sound form of education and credentialing?
- 2 What delivery and assessment models ensure that the credential is accepted as valid by industry, the professional (credentialed) community, employers, consumers, and academia?
- 3 What benefits would an employer gain from employing those with a certification?
- 4 What benefits do consumers (end users) get from having certified professionals service them?
- 5 Do certified professionals continue to pursue further certification/s?
- 6 How is industry certification appropriate for the SoDIS methodology?
- 7 What is the general opinion of a SoDIS risk assessment certification as described here?

While this research approaches the phenomenon of industry certification from a generic standpoint, it is grounded in certification for SoDIS as a particular certification case. SoDIS is outlined in Section 1.4.

1.3 Research aims and rationale

This research aims to determine if an industry certification is a pedagogically sound form of education, and, if so, if it is appropriate for the SoDIS risk assessment process, and the SoDIS Project Auditor (SPA) CASE² tool (referred to here jointly as the SoDIS methodology, or SoDIS). Second, the research examines how such a certification can be positioned within current certification models and practices. Information being sought is both an analysis of the experiences and perceptions of the actors within the certification industry, as well as experiences of the certification industry itself as replicated in the literature and from data collected in interviews with industry actors. The research will provide data that will strengthen the rigour, market validity, programme validity and value, and the overall success of a SoDIS-based certification programme.

This thesis is an analysis of current practices and models of industry certification, within the ICT (Information & Communications Technology)³ sector and beyond. Benefits and criticisms of certification as perceived by industry actors were reviewed, along with the juggernaut that is the certification industry itself (Hitchcock, 2005) - the nuts and bolts of certification. Certification trends and programme structure variances were studied, including an analysis of certification programme implementation and administration factors, assessment issues, contextualising the SoDIS process and a SoDIS-based certification within the industry certification and broader credentialing context.

Little research into the phenomena of industry certification was found in the literature search, with two minor survey-based research reports found and reviewed, both with not insignificant limitations (Cegielski, 2004; Cegielski, Rebman, & Reithel, 2003). A quantitative research study into industry certification metrics was found (Adelman, 2000). Few scholarly articles were found. This is corroborated by Mason (2003) who described Adelman's (2000) paper as "one of the relatively few scholarly articles on the subject" (p. 39).

² Computer Aided Systems Engineering.

³ A more recent derivative of, and used interchangeably with IT (Information Technology), and refers to the *industry* rather than a discipline within the industry.

Many of these articles focus on integration of IT industry qualifications with academic curricula, or simple comparisons between, and the complementary nature of, industry certification and academic qualification. This is outlined in Chapter 2, Section five.

Publications resulting from this research, therefore, adds to that relatively small body of literature.

Much of the literature reviewed has a strong marketing bias which has been taken into account and noted where relevant when citing the experiences and views presented in the text. Industry actors with close associations to and extensive knowledge of the industry are similarly noted. These notes, as well as my own comments as the researcher, based on my knowledge and experience of industry certification, are enclosed in boxes immediately following the related text. The literature review is the subject of Chapter 4.

In the following section, I outline the case in which this study is grounded: the SoDIS risk assessment methodology.

1.4 SoDIS

A software development project includes three major phases in its initiation stage: feasibility analysis, formulation of functional requirements, and detailing project tasks. Each of these phases can introduce inherent risks to stakeholders. SoDIS is a methodology or process of risk assessment inspection for software development, and other, projects. The purpose of the SoDIS inspection process is to identify the possible impacts to stakeholders of the risks within each of these project phases. SPA is the software CASE tool for project auditing and report production, and is used as a tool in the SoDIS risk assessment inspection process.

The SoDIS process is an assessment of *ethics-based risk*. Project and software requirements are inspected for downstream impacts related to, for example, unfair discrimination of, possible causes of harm to, and professional compromise to stakeholders and stakeholder groups, including the public (Gotterbarn, Clear, & Kwan, 2004), rather than risks associated with process, for

example, poor or inadequate project planning, deficient information gathering practices, or defective software development. The SoDIS process however, strengthens the integrity of final deliverables as it indirectly focuses attention on much of the project process itself.

The SoDIS process, and SPA, while in its prototype stage, has been successfully used in both teaching and commercial project analyses (as described in Kwan, Hitchcock, Clear, Gotterbarn, & Simpson, 2005). To strengthen and ensure its commercial and academic viability, a SoDIS-based risk assessment certification has been mooted. As a prerequisite, such a certification must be robust and pedagogically sound.

1.5 Locating myself in the research context

I became involved in the certification industry in 1990, as manager of Inforplex Software Limited (Inforplex), the second NAEC (Novell⁴ Authorised Education Center⁵) and, later, the first (of two) LAEC's (Lotus⁶ Authorised Education Center) established in New Zealand, and one of many offering Microsoft certification training, first operating in Auckland, then expanding into Christchurch, then Wellington. Auckland and Christchurch were also VUE⁷ testing centres.

In late 1999 until mid-2000, I was associated with VUE and CATglobal⁸ certification testing as manager of an authorised testing centre for each. This involvement in the certification industry, I believe, gives me the *authority of experience* (Munby & Russell, 1994; Scott, 1991) to inform the findings of this research with my own critical perspectives and judgments. Authority of experience is discussed in Chapter 3, Section eight.

I was in both the Industry Training and IT industry, in total, from 1979 until 2000, with the latter 10 years in a combination of both as described above. In

⁴ Novell, Inc.

⁵ American spelling is used as this is the part of the registered name.

⁶ Lotus Software, now part of IBM.

⁷ Virtual University Enterprises. VUE, now Pearson VUE, is a worldwide certification testing organisation.

⁸ CATglobal is a certification testing organisation.

2000 I became an academic, and am now a lecturer and programme leader for AUT University School of Computer and Information Sciences. Thus I have the industry, and now the academic credibility to have undertaken research in this field.

1.6 Significance of this research

The findings contained within this thesis will assist those sponsors wishing to investigate, implement, market, and administer a certification programme, in particular the Software Development Research Foundation (SDRF), the sponsors of SoDIS, and the SoDIS SEPIA⁹ collaborative partnership group (Clear, McHaney, & Gotterbarn, 2004) as interested stakeholders.

The literature review itself provides an introductory foundation for those wishing to research any aspect of the phenomenon of industry and professional certification further. The research methodology, joint use of phenomenography and IPA is, in itself, a topic of further study. A publication in each has already been attained (see Hitchcock, 2005, 2006). These are Appendices D and E. Other possible paper submissions are a second paper to the *ACM SIGCSE¹⁰ Bulletin (Inroads)*, to the ACM SIGMIS CPR¹¹ '07 Conference, April 19-21, 2007, and the 2006 IT Governance International Conference (IT Recruitment), November 13-15 in Auckland.

Findings of this research pertaining to SoDIS were presented at the 8th SoDIS Symposium held in Wellington on July 7th, 2006. The proceedings of this Symposium will be published in the NACCQ (National Advisory Committee for Computing Qualifications) published BACIT (Bulletin for Applied Computing and Information Technology) online journal later in 2006. The proceedings paper is Appendix F.

Furthermore, the findings of this research will assist potential certification candidates to choose an appropriate certification. It provides an assessment model for stakeholders, including employers, to assess the value and

⁹ Software Engineering Practice Improvement Alliance.

¹⁰ Special Interest Group on Computer Science Education.

¹¹ Special Interest Group on Management Information Systems, Computer Personnel Research.

pedagogical robustness of any given certification. The findings further provide a basis upon which academic institutions may evaluate and consider integration of appropriate certifications into their curricula.

1.7 Overview of Chapters

The following lists and outlines the remaining chapters of this thesis:

Chapter 2: The background context of industry certification

The history of industry certification and its extraordinary growth to where it is today is reviewed in this chapter. Professionalism and “a profession”, and the context of industry certification to professionalism and a profession are discussed. The trend toward integration of industry certification with academic curricula is reviewed and discussed.

Chapter 3: Methodology

Chapter 3 outlines and argues the methodology used for the research, along with its epistemological foundation and theoretical perspectives. Data collection and analysis methods used are outlined. *Authority of experience* is discussed.

Chapter 4: The literature review analysis

In this literature review chapter, I provide extensive review of the literature, including notations regarding the situation of the writer or industry actor whose experiences are detailed, and other relevant comments, as the researcher, based on my knowledge and experience of industry certification.

Chapter 5: The interviews analysis

The data collected from interviews with a purposive sample of certification holders and employers of certification holders is summarised in this chapter.

Chapter 6: Discussion, researcher perspectives, and conclusions

In the penultimate chapter, I provide a detailed discussion based on the analyses of the data collected from the literature and interviews within each of

the main category of meaning themes. The critical perspectives of the researcher are integrated into the discussion. Conclusions within these themes are presented.

Chapter 7: Implications and recommendations

In this final chapter, I present recommendations drawn from the conclusions detailed in Chapter 6, along with recommendations pertaining to SoDIS, and general recommendations from the research.

1.8 Conventions adopted

The following conventions have been adopted in this Thesis:

1. Editorial style, in-text citation, and referencing are according to the American Psychological Association (APA) (Fifth Edition), (2002). *Publication Manual of the American Psychological Association*. Washington, DC: APA
2. Where an industry actor's experience or direct quote is cited from the literature, whether or not they are the author, the first use of the actor's name in a *direct reference* (in each chapter) is in full and bolded. For example;

John Au (as cited in "On the right track", 1999)

If the same actor is cited in a different reference and it would otherwise be not clear that it is the same actor, the name is in full but not bolded.

3. As many *de-facto* industry conventions conflict with standard academic conventions in relation to the use of acronyms, the following conventions are used:

Where the acronym is a *recognised de-facto* description for the organisation, the acronym precedes the full title, for example;

the ACM (Association of Computing Machinery)

Where acronyms have become recognised company names and the full title is either disused or not used, the full title will appear in a footnote.

4. Note: While the present tense is frequently used in the discussion of the literature and interviewees' comments, it should be understood that all ideas are situated in the context of time and location of the written paper and interview. As pointed out by one of the examiners, past tense may have been more appropriate.

1.9 Personal certification stories

The following personal stories, three of many, illustrate the benefits of certification. Conversely, each also illustrate, and at the same time refute one of the major criticisms – “paper” certifications, that is the lack of any practical or experiential content. These issues are covered within this thesis. Furthermore, each support my own perceptions of industry certification.

John Gow enrolled for a CNE (Certified NetWare Engineer) programme, having borrowed the approximately \$NZ10,000 required. It was his passion to enter the IT industry and he had decided that a certification was the way forward. He completed the CNA (Certified NetWare Administrator) sub-set of CNE, obtained himself a job in IT, then switched to night classes to complete the CNE. He was a so-called “paper” CNA – but, for him, he had obtained his desired job in IT. He quickly completed the full certification then relocated to the UK, securing himself a network engineer position – as a “paper” CNE. He repaid the \$10,000 within the first 10 months of working (J Gow, personal communication, April, 1994). A few years later he had achieved MCSE (Microsoft Certified Systems Engineer) by self-study, and was working for Boeing in California for an hourly rate beyond my imagination (J. Gow, personal communication, June, 1997). For him, certification propelled him to places he had probably never imagined he could go.

Mathias Thurman, after many years on the job, decided to complete a CISSP (Certified Information System Security Professional) certification administered by (ISC)^{2@12} (International Information Systems Security Certification Consortium Inc.) (Thurman, 2001). Thurman had always thought that he did

¹² '(ICS)²' is the acronym for the International Information Systems Security Certification Consortium Inc.

not need a certification, that they were a waste of time, and his experience with interviewing job applicants with impressive certifications but little real-world experience reinforced this notion. Some certification candidates, however, did impress, as their certifications were based on hands-on lab tests, significantly the Cisco Certified Internetworking Expert (CCIE). Given this, and after meeting several CISSP professionals who impressed him with their knowledge and praise of the CISSP programme, he decided to “give in and take the ... exam” (para. 10). Thurman considered both the CISSP certification and the SANS¹³ Technology Institute’s GIAC (Global Information Assurance Certification), finally choosing the CISSP purely based on popularity (Thurman).

In 2000, Pierre Folkes found himself unemployed and decided to move into an IT career, as it had been his passion in college but never fulfilled. By September 2001 he had attained CompTIA’s¹⁴ A+ then Network+ certifications, however, due to “9/11” no-one was hiring (Venator, 2005). Folkes began his own computer repair and upgrade business, honing his skills with experience, and continuing to study. Soon he attained a night-time position with an IBM installation, and further upgrading his knowledge and skills, and attaining CompTIA’s Linux+ certification. Based on his ability to attain certifications as well as his experiential-based skills, Folkes was eventually offered a full-time technical position (Venator).

These stories describing personal experiences of industry certification serve to set the scene: to create a mental picture of the meaning of industry certification to these actors. In the following chapter, the background context of industry certification is explored to further set the scene for the research.

¹³ SysAdmin (System Administration), Audit, Network, Security.

¹⁴ Computing Technology Industry Association.

Chapter 2: The background context of industry certification

2.1 Introduction

This chapter reviews historical information, and contextual information where the research began to move away from the domain of *industry certification*. These themes, however, are included in the hierarchy of categories (see Figure 4, Chapter 4), and in the Discussion, researcher perceptions, and conclusions chapter (Chapter 6).

History

Section two reviews the history of industry certification from its emergence in the 1930s, to its adoption by the IT industry in the 1980s and the subsequent proliferation of certifications brought about by the emergence of the Internet and global internetworking.

Professional certification and continued certification

Industry certification is referred to by many as *professional* certification. Section three reviews professionalism and “profession” within the context of industry certification. The fourth section looks briefly at the trend for continued recertification (keeping one’s certification current), and the trend to obtain additional certifications.

Integration with academic curricula

Many claim that industry certification is complementary to academic degrees in computing giving students a well-rounded basis from which to move into industry, as without specific product experience many employers are reluctant to hire (Cosgrove, 2004). Section five reviews the literature pertaining to integration of industry certification with academic curricula.

2.2 A brief history of industry certification

Certification administered by industry or a profession, outside formal academic curricula, has been a form of credentialing for decades. For example, in 1938, due to a need for a common approach to testing, the Association of Short-circuit Testing Authorities (ASTA) was formed, along with ASTA Certification Services, with the full support of the then UK Government Department of Scientific and Industrial Research (ASTA BEAB, 2004). The Institute of Certified Professional Managers (ICPM) Certified Manager (CM) claims a 30 year history (“ICPM offers manager credential”, 2005). Novell, Inc. began testing and certifying IT industry and IT network *professionals* in 1986 (Cosgrove, 2004; Novell, 1996). Global certification testing centres were established in 1990 by Drake International¹⁵ (Foster, 2005). Novell claimed their one-millionth certification in 1995 (Novell, 1996).

In 1990, IT certification was well established, with Novell as the “giant” of certification and Microsoft about to become so (see Alexander, 1998b). The Internet was soon to burgeon, and along with it a plethora of new certifications. Today, the number of certifications is impossible to quantify but experts believe professional designations to be in the thousands (Knapp & Gallery, 2003), with regular announcements of new or updated programmes. Academic institutions, both at tertiary and at secondary level, are integrating IT industry certification into their curricula (Adelman, 2000; Clear, 2002; Clear & Bidois, 2005; Cosgrove, 2004; Hilson, 2001; “ICPM offers manager credential”, 2005; Robertson & Corbett, 2004; Wellington Institute of Technology, n.d.), many through programmes such as the Microsoft IT Academy, the Cisco¹⁶ Networking Academy.

Following his quantitative study in 2000, Adelman (2000) lists the following IT certification metrics:

1. Over 300 discrete certifications.

¹⁵ Subsequently Sylvan Prometric, now Thomson Prometric.

¹⁶ Cisco Systems Inc.

2. Approximately 1.6 million individuals worldwide have earned approximately 2.4 million certifications.
3. Over 500,000 MCP (Microsoft Certified Professional) certifications.
4. 370,000 CNA (Certified Novell Administrator) certifications.
5. Over 279,000 MCSE (Microsoft Certified Systems Engineer)
6. 175,000 CNE (Certified Novell Engineer).
7. 150,000 A+ certifications.

The growth rate has certainly not slowed.

A decade ago, IT certification tests were largely knowledge-based, allowing candidates to obtain a certification with little or no on-the-job experience. This led to widespread criticism, and the use of the term “paper” certifications. While this criticism was both valid in many circumstances, and unfair in an equal number, the trend in many certification programmes has, understandably, been away from knowledge-based toward performance-based programmes. With this trend, the benefits and supporters of industry certification are many, with the negatives and critics seeming to fade into an insignificant background.

Hale (2000) describes the significant growth in industry certification in her 30 years experience in the certification industry:

The computer industry ... now uses certification to promote brand recognition among consumers, to qualify individuals as expert users of specific products, and to officially recognise preferred distributors. ... Professional societies are certifying their members and others who meet their criteria. Corporations are certifying their employees, their suppliers, their vendors – even their customers – to demonstrate competence in discrete areas. (p. xi)

2.3 Professionalism and a “professional” designation

Most writers reviewed refer to certified individuals as “professionals”. Pierson, Frolick, and Chen (2001), however, make the distinction between *professional*

certification where the certification is vendor-neutral¹⁷ as opposed to *proprietary* certification, they being the only authors reviewed that use the term “proprietary”¹⁸. According to the Association of Administrative Professionals New Zealand Inc. (AAPNZ) (2002), certification is a system that “recognises you are a *professional* [italics added] at the work you do” (para. 2), and “are benchmarked as being up to the standard required to practice ... [the] *profession* [italics added]” (para. 3).

Cegielski et al. (2003) say that the elements that comprise a profession vary greatly with the consulted source, and use the denominators of expertise, autonomy, and certification (Haskell, as cited in Cegielski et al.) as their framework (Figure 1). They argue that as certification is based on an acceptable range of knowledge application the professional can independently apply the full range of that knowledge, saying that autonomy is the element of discretion given to a professional (Perks, as cited in Cegielski et al.), and with autonomy comes independence of decision making and responsibility for those decisions (Sagar, as cited in Cegielski et al.). They state that “independence gives the professional a certain amount of power and prestige as he or she retains control over his or her own work” (para. 8).

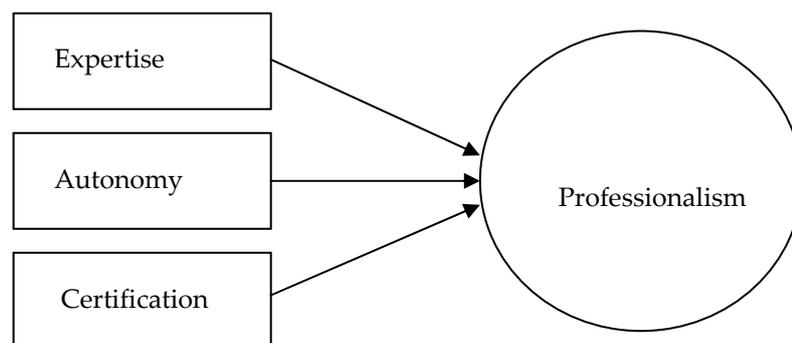


Figure 1. Conceptual model of professionalism (Cegielski et al., 2003, p. 99)

“As a person learns more and more and becomes skilful within a particular domain of knowledge, the structure and processes of memory are altered and refined” (Kellog, as cited in Cegielski, et al., 2003, p. 98). This, argue Cegielski et.al., is a defining characteristic of expertise among professionals. They add;

¹⁷ Not aligned to the usage of a specific product.

¹⁸ Elsewhere this is referred to as “vendor-specific” and is inclusive in *professional* certification.

“typically, one gains expertise in a knowledge domain through formal education and the application of learned knowledge (Roy & MacNeill, 1967)” (Cegeilski et al., p.98).

John Au (as cited in “On the right track”, 1999), Business Development Manager for NTT Data Corp, Malaysia, states that professional certification; is the indicator of understanding and knowledge of specific skills[,]... sets a foundation to what professionals should learn to become competent in the product or service[,] and it indicates that an individual is an expert in the field of the certification” (para. 7).

Wikipedia (2005c) defines a *professional* as one who; works to receive payment for an activity which usually requires expertise ... [and whose] actions remain in accordance with specific rules ... By extension, the adjective *professional* can indicate that someone has great expertise or skill in a[n] ... activity. (para. 1)

A *profession*, according to Wikipedia (2005b), is “a specialised work function, ... generally performed by a *professional*” (para. 1), and in a more restrictive sense “often refers specifically to fields that require ... mastery of specialised knowledge, such as law, medicine, ... nursing, ... or engineering” (para 2.)

Abran, Moore, Bourque, and Dupuis (Eds.) (2004), in the IEEE Computer Society report *Guide to the software engineering body of knowledge*, assert that in order for software engineering to be known as a legitimate discipline and recognised *profession*, a consensus on a core *body of knowledge* is imperative (see also Thompson, 2001). This argument is supported by Starr (in his Pulitzer prize-winning book on the history of the medical profession in the USA, 1982) (as cited in Abran et al.), who states that legitimisation of a profession involves three distinctive claims: the knowledge and competence of the professional is validated by a community of their peers; the consensuality of the knowledge rests on rational, scientific grounds; and the professional’s judgment and advice are oriented towards a set of substantive values.

Ford and Gibbs (as cited in Abran et al., 2004), following a study of several recognised professions add that a profession is characterised by:

1. An initial professional education in a curriculum validated by society through accreditation.
2. Registration of fitness to practice through certification or licensing.

3. Specialised skill development and continuing professional education.
4. Support through a professional society.
5. Commitment to norms of conduct usually through a code of practice or code of ethics (see also Gotterbarn, 1997).

The New Zealand Computer Society Inc's (NZCS) *Code of ethics & professional conduct* contains predominant use of the words *professional* and *professionalism* (New Zealand Computer Society Inc (NZCS), n.d.).

A profession may also *licence* their members to use specific titles or perform specific tasks, demanding an extra measure of competence and dedication (The National Society of Professional Engineers (NSPE), 2005). Specific use of the title "Engineer" (rather than specific use of the term "profession" or "professional") appears to be formally licensed according to State (in the U.S. and Canada) (see Speed, 1999), or according to Country (see Burrige, 1999; Schreiner, 1999). This is *licensure*, a distinct, but not mutually exclusive, form of credentialing.

2.4 Continued certification

According to **Martin Bean** (as cited in Clancy, 2003), COO of New Horizons Computer Learning Centres, most studies he has seen indicate that there is "an extremely high likelihood that somebody who takes a certification will go on and want to be recertified" (para. 18). Bean says that "the average technical personnel over their lifetime will get between four and five certifications" (para. 18). Bean points out that many people certified in a particular technology will, if that technology declines in popularity, become certified in the newly popular technology. The example of many Novell certified professionals obtaining Microsoft certifications, while still retaining their Novell certifications up to date, is a case-in-point (Bean, as cited in Clancy).

The above view concurs with my own experience. It further concurs with John Gow's and Pierre Folkes' personal stories outlined earlier in Chapter 1 Section nine.

2.5 Integration with academic curricula

While the view of the Joint Task Force for Computing Curricula (Shackelford, et al., 2005) is that academic integrity and ethics become an issue when integrating industry certification programmes with academic curricula, others openly advocate such integration (see Adelman, 2000; Brookshire, 2000). Adelman, a Senior Research Analyst for the U.S. Department of Education Office of Educational Research and Improvement, describes industry certification as “a parallel postsecondary universe” (title), and goes so far as to state that:

these people – and others – will go to school in very different ways than was true as recently as 1990. Yet we have not factored in multi-institutional attendance and secular providers ... We talk glibly of “tsunamis” for which we are unprepared, rush to open branch campuses on 24/7 schedules, and flagellate ourselves when students disappear. We may turn around one day and find that these students have “disappeared” into the world of secular providers ... (p. 32).

Mason (2003) says that many computer science departments are reluctant to change and to embrace industry certification. On more than one occasion, he says, he has encountered the phrase “*this is a university, not a trade school*” (p. 40). Ortiz (2003) says that from an academic point of view, “computer science departments should be *educating* students ... and not *training* them...” (p. 178). However, many tertiary, and now secondary academic institutions, have integrated, or are in the process of integrating, industry certification into their curricula (see Clear, 2002; Clear & Bidois, 2005; Cosgrove, 2004; Hilson, 2001, Mason, 2003; Nelson & Rice, 2001; Wellington Institute of Technology, n.d.). Notably, CIT (Central Institute of Technology), now integrated with Wellington Institute of Technology (WelTech), has been offering industry certification since circa 1990 and is a certification testing centre. They will cross-credit these external exams as credits towards their own qualifications (Wellington Institute of Technology, n.d.).

Roberton and Corbett (2004) believe that the advantages of integration of industry certification with academic curricula “significantly outweigh drawbacks” (p. 431), however they do not say what the advantages or drawbacks are. They list a number of ITPs (Institutes of Technology and Polytechnics) who have positioned themselves to offer industry certified qualifications, and note the preference of many job advertisements for an

industry certification *additional* to a traditional tertiary qualification (New Zealand Herald, 2004; SeekIT, 2004; as cited in Robertson & Corbett), or as the *preferred* background (Adelman, 2000). Nelson and Rice, 2001, say that “employers often desire and may even require certain computer certifications as a condition of employment” (p. 280).

Au (as cited in “On the right track”, 1999) believes that professional certifications are complementary to basic academic degrees, as degrees set a path for a career but are insufficient to furnish specific skills. Cosgrove (2004) appears to agree, noting that while academic institutions give students a well-rounded academic base to enable them to move into industry, industry certification adds competence to use specific products. Waikato Institute of Technology, according to Robertson and Corbett, introduced Cisco certification into their curriculum in order to add value to current offerings and to establish relationships with the IT industry. Cisco Canada is partnering with post-secondary schools to introduce two of their certifications into the schools’ curricula, as Cisco believes that post-secondary institutions are better equipped to deliver advanced curricula (Hilson, 2001). Cisco certifications are gained as a byproduct of the Masters of Internetworking degree at the University of Technology in Sydney (Hughes, as cited in Clear, 2002). Cisco and Microsoft as two examples, through the Cisco Networking Academy and Microsoft IT Academy respectively, provide curriculum materials to academic institutions and will train teachers to deliver the curriculum. Academy programmes are available in a number of countries, including New Zealand. Cisco offers the Cisco Certified Network Associate (CCNA) programme (Alford, 2005). Other programmes integrated into academic curricula include CompTIA’s A+ programme, and Microsoft’s MOUS (Microsoft Office User Specialist) (Nelson & Rice, 2001). While Ortiz (2003) states the premise mentioned earlier that computer science departments should be educating students and not training them, his own department has integrated Sun Systems Java certification into their own curricula claiming that “students get a deeper understanding of the Java language, in a way that otherwise just wouldn’t happen” (p. 182).

In a further example, the ICPM certification for IT technical managers operates in conjunction with James Madison University (“ICPM offers manager credential”, 2005).

These numerous examples of the integration of industry certification with academic curricula suggest that the academic institutions themselves regard industry certification as pedagogically valid. This notion will be further explored in Chapter 6, “Discussion, researcher perceptions, and conclusions”.

Chapter 3: Methodology

The methodological approach, the joint Interpretive Phenomenological Analysis (IPA) and phenomenography approaches used for this research, is outlined in this Chapter, along with the rationale for this joint approach (Section two). The relationships in this research between IPA and phenomenography are looked at in Section three. The philosophical foundations upon which the methodology is based is outlined in Section one. Section four contains outlines issues of validity and reliability, Section five contains an outline of the data analysis method adopted, and Section six contains a discussion on Authority of Experience (Munby & Russell, 1994; Scott, 1991).

3.1 A socially constructed phenomenon

While some organisations are attempting to introduce standards for worldwide computer literacy for vendor-neutral, performance-based certification (Michael & Thomas, 2004), no central or governing body controls the development of industry-based certification, nor of its standards. The value and validity of each certification is gauged by each individual certification holder or certification candidate, by the industry or profession the certification represents, or by an employer undertaking investigation for recruitment. Industry certification is therefore a *socially constructed phenomenon*. The philosophical underpinnings are based in social constructionism: that meaning is constructed from interactions with realities, and that different people will construct meaning from the reality of the phenomenon in different ways (Berger & Luckman, 1966; Crotty, 1998; Larkin, n.d.). According to Berger and Luckman, reality is socially constructed through the following processes:

1. The phenomenon is observed by an interested actor as objective reality.
2. The reality is internalised by the actor.
3. Once internalised, the phenomenon becomes the actor's subjective reality.
4. The phenomenon becomes legitimised and institutionalised.

Further evidence is provided by Boghossian (2001) who argues that a phenomenon is socially constructed if it is contingent on our social selves, i.e. it would not exist had we not built it, that it serves a social purpose, and we can freely reject it. Furthermore, Boghossian argues, we impose structure on it by social-construction talk. Shaw (n.d.) argues that social constructionism reveals how internalised and externalised constructs interrelate and stimulate further construction of beliefs. Industry certification would not exist had it not been conceived and built by social beings; it serves a social purpose - a credential, for those actors who play a part; and can be freely rejected, by those who do play a part, including those who conceived of it and built it, and by those who choose not to play a part.

The research takes its theoretical foundation from hermeneutics - the theory of interpretation, and is concerned with symbolic interactionism, that is the meanings individuals ascribe to a phenomenon are of central concern, and are obtained through an analysis of the experiences of these individuals within this phenomenon through a process of interpretation (Birkbeck University of London, 2005; Smith, 1996; Smith, Flowers, & Osborn, 1997). Hermeneutics allows the researcher to bring forward interpretations of experience of this phenomenon into a holistic understanding (Silvers, 2002). According to both Candy (1989) and Webb (1990), "the hermeneutic world view recognises multiple interpretations of different events, based on different understandings, motives and reasoning of unique individuals" (as cited in Melrose, 1996, p. 51). Melrose argues that there are many and varied meanings for individuals as they interact with their environment.

3.2 Joint methodology

Marton (2000) posits that research about a phenomenon will reasonably tell us something about that phenomenon. Much of the focus of interest of this research is the conscious intuitive individual experiences and personal perceptions of actors within the phenomenon of industry certification, examining the essence of what is experienced, and extracting the *essential features of the phenomenon itself* (Smith, 1996; Smith, 2003; Wikipedia, 2005a). The chosen approach for this aspect is *Interpretive Phenomenological Analysis* (IPA).

An additional focus is the variation in ways actors experience the industry certification phenomenon and their resulting belief construction (Booth, 1997; Marton, 1986), to extract *the essence of the way industry certification is understood*. The chosen approach for this is *Phenomenography*.

This joint methodologies approach has been adopted to, first, understand the phenomenon of industry certification *itself* in order to design and develop a programme with educational and industry validity, integrity, and substance. Second, to understand how participants *experience* industry certification in order to adopt a programme that appeals to and has value for those prospective candidates for a SoDIS certification.

3.2.1 The essential features of the phenomenon

This aspect of the research is concerned with the actors' individual experiences of the phenomenon rather than the objective reality itself or testing a pre-conceived hypothesis. It is, therefore, phenomenological (Giorgi, as cited in Smith, 1999; Smith, 1996, 1999; Smith, et al., 1999).

From an IPA viewpoint, the research takes the conscious intuitive experiences of actors within the phenomenon as recorded in literature, and from interviews, then extracts the essential features and essence of industry certification from the first person point of view (Smith, 2003; Wikipedia, 2005a). IPA recognises that different people perceive phenomena in very different ways depending on their circumstances (Smith & Osborn, 2004). This aspect of the research, therefore, extracts individuals' viewpoints and how they make sense of industry certification by interpretation of accounts of experiences in order to understand the phenomenon itself, that is, industry certification.

According to Husserl (as cited in Benner, 1994), the goal of interpretive phenomenology is to study the phenomenon on its own terms. IPA explores in detail the actors' views and their personal perceptions of the phenomenon in their own words by tapping into their natural tendency for self reflection; an "insider's perspective", (Smith, 1996, p. 264; Smith, et al., 1997, p. 69; Smith, Jarman, & Osborn, 1999, p. 218), which is complicated by the researcher's own conceptions, which are indeed required in order to "make sense of the other

personal world through a process of interpretive activity” (Smith, p. 264; Smith, et al., p. 219). While phenomenology normally requires the researcher to stand aside from the data (Marton, 1986), IPA, say Smith, et al., “signal these two facets” (p. 219). Reynolds (2003) says that IPA accepts that “each researcher brings particular concepts to the process of analysis” (p. 554). Chapman and Smith (2002) state that “IPA recognises that the researcher’s own conceptions are required in order to make sense of ... [that] studied” (p. 126; see also Smith, Michie, Stephenson, & Quarrell, 2002). Chapman and Smith argue that IPA is concerned with the “chain of connection” (p. 126), that is, that while recognising that gaps may exist between a state and an actor’s perception of that state, the IPA researcher is concerned with exploring the nature of that gap.

An IPA methodology allows the researcher to examine the essence of industry certification from the interpretation of actors’ experiences. IPA was developed in the 1990s by Dr Jonathan Smith who says that IPA recognises that it is a “process of interpretation by the researcher” (Smith, n.d., para. 1). Used extensively in health research, IPA examines the experiences of the patient of a condition (the phenomenon) in order to understand the condition (the phenomenon), and to draw on the researcher’s own experience and conceptions. While, IPA uses predominantly purposive sample interview methods (see MacLeod, Craufurd, & Booth, 2002; Smith & Osborn, 2004), Smith (1999) argues that interpretive engagement with texts is also necessary. Chapman and Smith (2002) state that as researchers wish to analyse and make sense of how actors perceive and make sense of a phenomenon, IPA requires a flexible data collection method. Smith (1996) posits that a study using IPA might enrich literature previously studied only quantitatively. As previously stated, this research is predominantly literature-based.

As previously noted, this research also collects empirical data from a small purposive sample.

Smith (2004) presents three distinctive characteristics of “classical” IPA:

1. Idiographic: Typically, a detailed analysis of one case is carried out until some degree of closure before moving on to further cases.

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2. Inductive: The research employs techniques flexible enough to allow unanticipated categories and themes to emerge. The researcher does not attempt to verify or negate specific hypotheses but constructs broader questions leading to expansive collection of data.
 3. Interrogative: The research methodology makes a contribution to existing research.

Given, however, that this research is predominantly literature-based, it endeavors to follow the “classical” characteristics posited by Smith (2004):

1. The researcher has carried out a detailed analysis of each literature piece and interviewee in turn until saturation before moving on to another.
2. The researcher has not attempted to verify or negate specific hypotheses at the time of data analysis, but has constructed broader questions leading to a more expansive collection of relevant data. The researcher has, however, in the write-up, informed the analysis of selective data with his own experiential-based perspectives.

The researcher believes that this research and its use of the IPA methodology, jointly with phenomenography, will contribute not only to existing research on industry certification, but will significantly add to the body of literature, as well as to the application of both the IPA and phenomenography methodologies.

Smith (2004) further posits the following typical features of IPA:

1. IPA recognises that different levels of interpretation are possible. This research is grounded on that notion.
2. The data is parsed for both the themes that are emerging, as well as from the individual’s own account. Furthermore, that the write-up links both the generic themes that are emerging in the analysis, and the life-world of the key participants who have recounted their experiences. This process has been followed in this research. In the cases where the circumstance of the actor whose experience is being related is deemed of essence by the researcher, the write-up of the analysis follows this model.

3. If a data source proves particularly rich in substance or is compelling, the researcher continues an analysis of that data through to saturation. This process has been followed in this research.
4. IPA carries out themed analysis on a small sample, and in some instances on a single case.

This research makes a reasoned variance to this typical feature. As this research is largely based on secondary-source material, from broad sources rich in data, it is my conviction that higher levels of rigour are attained from the multiplicity of experiences contained in the material than would be the case from close interviews with a small sample. Furthermore, this data is informed by my own life-world experiences within the domain which is the focus of the research. In itself, this represents IPA's focus on a single case. As has been cited earlier, interpretive engagement with texts is necessary (Smith, 1999), and, as researchers wish to analyse and make sense of how actors perceive and make sense of a phenomenon, IPA requires a flexible data collection method (Chapman and Smith, 2002). Further still, however, the research is informed from data from a small, purposive sample. As researcher, I am confident that should another researcher carry out similar research using primary sources, the findings of this research will stand critical scrutiny as being both reliable and robust.

3.2.2 The essence of the actors' understanding of the phenomenon

According to Marton (1986), phenomenography "investigates the qualitatively different ways in which people experience or think about various phenomena" (p. 31), with the focus on *variation* (Trigwell, 2000) (see also; Johansson, Marton, & Svensson, 1985; Marton, 1981; Uljens, 1996). Marton (1981) says that phenomenography aims at the "description, analysis, and understanding of experiences, that is ... [it] is directed towards experiential description" (p. 180). Marton argues that while phenomenology is a study of the first perspective, which is of the event (phenomenon) itself, which he describes as a first-order study through that which is experienced, phenomenography separates the

experience itself through a second perspective, or second-order study of the actors' experiences themselves.

Phenomenography, an approach to educational research that appeared in publications in the early 1980s (Marton, 1981; 1986), initially emerged from an empirical rather than theoretical or philosophical basis (Åkerlind, 2005). Phenomenography allows the researcher to focus on the variation in ways actors experience a phenomenon, knowing about it, having skills related to it, and the variations therein (Åkerlind; Booth, 2001; Marton, 1996). Its outcomes are the qualitatively different ways of experiencing a phenomenon, or meanings derived there from (Åkerlind). These different ways, says Åkerlind, are "categories of description' to distinguish the empirically interpreted category from the hypothetical experience... [which include] structural relationships linking the different ways of experiencing" (p. 322).

Phenomenography accepts, as its starting point, that consciousness must be understood in terms of what an actor is aware of in being aware of something (what), and is aware of something in some way (how) (Uljens, 1996). Phenomenography, according to Svensson (1997), "is not a system of philosophical assumptions and theses, and is not derived from such a system" (p. 164), with its characteristics being the emphasis on description. Säljö (1994) states that descriptions of how people conceive things "forms a legitimate task for empirical investigation" (p. 72).

Marton (1981, 1986) posits that phenomenography is substance-oriented, that is empirical rather than methodological, and deals with the conceptual, experiential, and what is thought of as that which is experienced, as well as the individually developed ways of relating to it, as affected by the actor's age, historical period, culture or sub-culture (see esp. Marton, 1986). It deals with the *content* of thinking (Marton, 1986; Svensson, 1997). As an experience is described from the second-order, Marton (1981, 1986) argues, this does not necessarily concern the *correct* meaning, but rather the meaning the actor ascribes (see also Uljens, 1996). Phenomenography then, Marton (1986) further argues, "provides descriptions that are relational [to the actor], experiential, content-oriented, and qualitative" (p. 33). Marton (2000) says that

phenomenography allows us to describe “conceptions of various specific things [bracket removed] instead of formulating general principles about how things appear to us” (p. 103). “Someone’s way of experiencing something” (p. 105), Marton (2000) adds, can be seen in relation to others’ way of experiencing the same thing (see also Uljens). Uljens adds that an individual may also express two different conceptions about the same thing, and that it is not of phenomenographic interest to understand *why* an individual holds a given perception.

While phenomenographic research is usually carried out with the use of the interview, that is the collection of data specifically for phenomenographic analysis (Chapman & Smith, 2002; Marton, 1981), Bowden (2000), however, suggests that all *relevant* aspects of *any* research be undertaken in a phenomenographic manner. Bowden’s view, however, is that such studies are examples of a certain aspect of phenomenographic research, and, in this case, a phenomenographic analysis rather than a full phenomenographic study, and that this should be made clear in the research report and any publications arising from the research. This research, therefore, will carry out a phenomenographic analysis of material not specifically made for the purposes of phenomenographic analysis, that is, literature. Additionally, it will collect empirical data through interviews with industry actors.

Phenomenography’s focus is on a collective analysis rather than on individual experience. It explores “the range of meaning within a sample group, as a group, not the range of meanings for each individual within a group” (Åkerlind, 2005, p. 323). Åkerlind points out that;

no one interview transcript ... can be understood in isolation from the others. Every ... expression of meaning is interpreted within the context of the group of ... meanings as a whole, in terms of similarities to and differences from other ... meanings (p. 323).

The *set of categories of meaning* that result are not determined in advance but emerge from an analysis of the data in relationship with the researcher (Åkerlind). These categories of meaning are explained in Section 3.5.

As IPA does, phenomenography also allows the researcher to use their own experiences as data for phenomenographic analysis (Berglund, 2005; Säljö, 1996;

Uljens, 1996). According to Berglund, “the researcher himself (sic) – his beliefs, interests, previous experience, network of discussions, even personality, - is essential for the outcome of a project and become, to a certain degree, part of the results” (p. 35). The outcome of phenomenographic research, he posits, is the researcher’s interpretation of the actors’ understanding, shaped by both the researched and the researcher (see also Säljö). Furthermore, Uljens supports the argument presented earlier that what is experienced occurs in relation to a social, cultural, and historical context. In the case of this research, I, the researcher, have also had considerable experience in the phenomenon, therefore the beliefs, previous experience, and network of discussions becomes valid grounded data through *authority of experience* (Munby & Russell, 1994; Scott, 1991). Experiences from the literature and from the interviews are also examined for context as mentioned earlier (see Figure 2).

3.3 Relationship between IPA and Phenomenography

Figure 2 illustrates the relationship in this research process between the first order study of the phenomenon using IPA, a study of the phenomenon itself along with the resulting analysis, and the second-order study of actors’ experiences of the phenomenon using phenomenography. Using IPA the phenomenon or event, industry certification, is studied through the experiences of the actors and of the researcher, then analysed. Concurrently, using phenomenography, the various ways actors experience industry certification is studied, taking into account the context of that experience along with my own experiences and perceptions. The resulting findings combine both the essence of industry certification, and the essence of the way industry certification is understood.

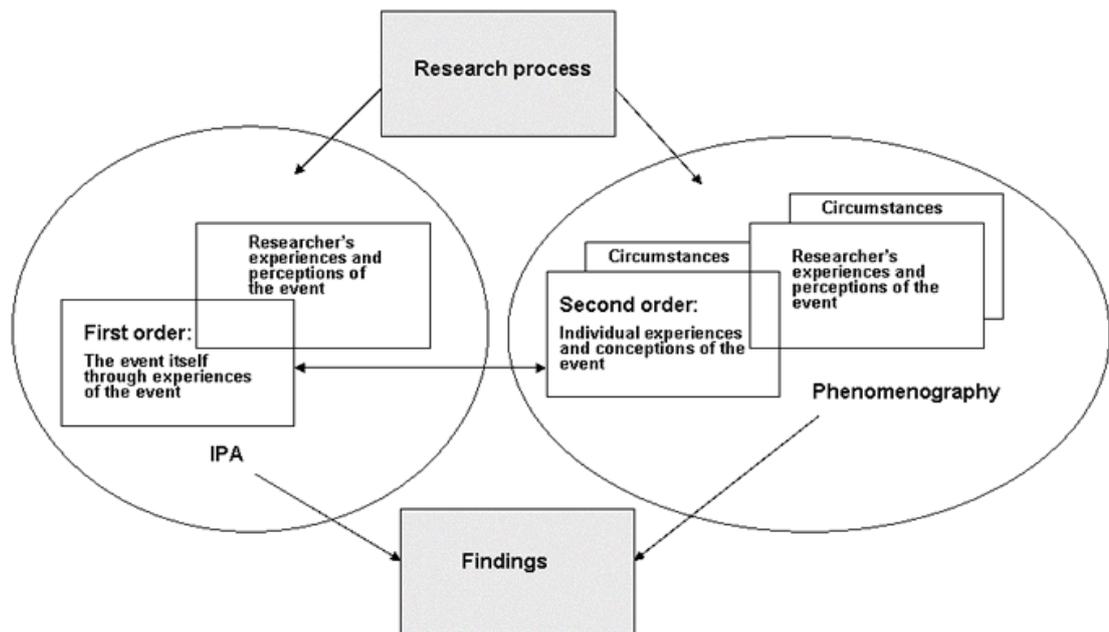


Figure 2. Relationships between first-order, second-order, the researcher, and the analysis

3.4 Validity and reliability

Åkerlind (2005) addresses the issue of validity, saying that qualitative researchers “are still traditionally expected to address issues of ... validity and reliability ...” (p. 329). Validity in phenomenographic research asks how well the research outcomes correspond to human experience of the phenomenon rather than how well the outcomes correspond to the phenomenon as it exists in reality (Åkerlind, 2005; Uljens, 1996). IPA of the phenomenon itself, therefore, through the experiences of actors, strengthens the validity of the phenomenography aspect of this research, as well as the overall research itself.

Åkerlind (2005) also addresses the issue of reliability, arguing that rather than seeking like interpretations from multiple interviewees, a strong emphasis is placed on the researcher’s ability to argue for the multiple legitimate interpretation of the same phenomenon. Seeking feedback from interviewees, Åkerlind points out, is not appropriate for phenomenography research, that is research through experiences of a phenomenon and therefore the researcher contends, of IPA likewise, as the researcher’s interpretations are made on the collective, not on an individual, basis.

3.5 Methods of data analysis

Phenomenography sorts the understandings of actors into specific categories of description which emerge from an analysis of the data collected (Åkerlind, 2005; Marton, 1981, 1986; Johansson et al., 1985; Säljö, 1994; Svensson, 1997; Uljens, 1996), representing conceptions identified from some form of communication (McCosker, Barnard, & Gerber, 2003). These categories (and the underlying structure) become the phenomenographic essence of the phenomenon (Uljens). They are, Marton (1986) contends, the primary outcomes and the most important result, of phenomenographic research. Marton (1986) argues that while research results are supposed to be replicable, this is not always necessarily the case, presenting the example of the probability of two botanists discovering the same plants and species if they independently explored the same island, and that the same analogy applies to phenomenographic categories. On the other hand, he says, it must be possible to reach a high degree of inter-subjective agreement concerning their absence or presence by different researchers undertaking the same research.

Marton (1986) further argues that the set of categories is both stable and generalisable between situations, and that actors can move from one category to another on different occasions. Marton's view is that the contents of the categories should be the target of empirical investigation; something to be described and analysed, and recognised as results (see also Johansson, et al., 1985). Categories are logically related to one another, typically by way of hierarchically inclusive relationships (Marton & Booth, as cited in Åkerlind, 2005). The process, Åkerlind points out, "is strongly iterative and comparative ... involving the continual sorting and resorting of data plus ongoing comparisons between data and the developing categories of description, as well as between the categories themselves" (p. 324), until the whole set of meanings is stabilised (Marton, 1986).

This research identified hierarchical categories that describe ways of thinking about the phenomenon of industry certification, and describes and analyses these. Säljö (1996) endorses the legitimacy of using descriptions of how people

conceive phenomena for empirical analysis, a trend, he says, since adopting the term “phenomenography” (Marton, 1981).

IPA adopts a similar method of data analysis of grouping into broad interpretive categories which is then broken down into more specific themes (Reynolds, 2003; Macleod, et al., 2002; Senior, Smith, Michie, & Marteau, 2002).

Åkerlind (2005) states that a feature of phenomenography is variation in practice, including variation in ways of constituting structure of data. Åkerlind points out that a phenomenographic researcher “aims to constitute not just a set of different meanings, but a logical structure relating the different meanings” (p. 329). The data analysis method adopted by this research reflects both phenomenography’s hierarchy of categories of meaning and their relationships, and IPA’s interpretive categories broken down into more specific themes. Categories and themes have emerged from the data during data analysis and sorting, and were not imposed upon the data in advance (Åkerlind, 2005). These categories and themes, with their hierarchical relationships, are illustrated in Figure 4, Chapter 4.

3.6 Interpreting the literature

The text interpretation process takes account of Heidegger’s (referred to in Conroy, 2003) threefold structure of interpretation: *fore-having* (interpretation founded in something understood in advance – the researcher’s own experiences in the phenomenon), *foresight* (the researcher’s point-of-view fixed to that which is understood to be interpreted), and *fore-conception* (the researcher already has expectations as to what will be found). The researcher therefore is required to understand these fore-projections which will be constantly revised as penetration into the interpretations of the meaning to individuals of the phenomenon, rather than facts about the phenomenon, that emerge and are understood from the research (Gadamer, 1989; Smith, et al., 1997).

Valdes (1987) argues that there is no “interpretation of text that is so certain that no reasonable person would question it” (p. 57). He posits that the meaning of a text is derived from its make-up, which is; its form, its history, the reading

experience, and the interpreter's self-reflection" (p. 60), that a literary work "transcends the psychological and sociological conditions of its production and thereby comes into a new relationship that cannot be circumscribed" (p. 61). Valdes proposed four structured questions as a basis for literary analysis and criticism:

1. How does the text operate?
2. What does the text speak about?
3. What does the text say to me?
4. How have I read the text? (p. 67).

These questions are acknowledged and adhered to by the researcher, as well as acknowledging variations in understanding by the actors.

The different interpretations of understanding and meaning that emerge during interpretation of the literature, in both IPA and phenomenography, become *categories of meaning* (as explained in the previous chapter) that are constructed into an interrelated hierarchy of categories and themes within categories.

3.7 Qualitative interviews

According to Anderson and Arsenault (1998), interviews are "a specialised form of communication between people for the specific purpose associated with some agreed subject matter" (p. 190). Rubin and Rubin (2005) describe qualitative interviews as;

conversations in which a researcher gently guides a conversational partner in an extended discussion. The researcher elicits depth and detail about the research topic by following up on answers given by the interviewee... (p. 4).

Rubin and Rubin (2005) present a two-dimensional matrix of examples of various types of qualitative interviews grouped into the two dimensions of breadth of focus, and subject of focus as illustrated in Figure 3.

	Narrowly focused scope	In-between	Broadly focused scope
Focused mainly on meanings and frameworks	Concept (and meaning) clarification	Theory elaboration	Ethnographic interpretation
In-between	Exit interview	Oral histories	Life history
Focused mainly on events and processes	Investigative interviewing	Action research Evaluation research	Elaborated case studies

Figure 3: The variety of qualitative interviews (Rubin & Rubin, 2005, p. 5)

This research acknowledges Rubin and Rubin's (2005) definition of qualitative interviewing and follows the process described by the definition. The interview type falls into the concept and meaning clarification category (top left) within their matrix (Figure 3).

The interview type is *key informant*, designed to "probe the views of a small number of individuals" (Anderson & Arsenault, 1998, p. 191). The interview paradigm is *interpretive constructionist*: the interviewer elicits the interviewee's views of the phenomenon in focus, and the events within the domain of the phenomenon that they have experienced or observed (Rubin & Rubin, 2005). Further, the interviews follow Rubin and Rubin's *responsive interviewing* model: the interview is between two human beings who form a relationship during the interview thereby generating ethical obligations for the interviewer; the goal being to generate depth of understanding; and the design of the research remaining flexible. Responsive interviewing is indicative of the semi-structured nature of the interviews, where the interviewer initially establishes the general direction and the conversational partners set a more specific path where;

initial questions are expressed in a broad way to give the interviewees an opportunity to answer from their experiences. The interviewees' answers then suggest to the researcher what to pursue and what to ignore (Rubin & Rubin, 2005, p. 32).

The interviews were thus conducted: in a "low-key and open-ended way" (Rubin & Rubin, 2005, p. 32), encouraging the conversational partners to explore

topics and meanings that are important to them (Rubin & Rubin). Depth was achieved by exploring the complexity of multiple, overlapping, and sometimes conflicting themes, and by focusing on the specifics of situation and meaning (Rubin & Rubin).

3.8 Authority of experience

Schön (as cited in Munby & Russell, 1994) posits that knowledge that resides in action is knowledge that allows professionals to perform, and that learning from experience has its own epistemology. Munby and Russell argue that a professional's knowledge-in-action gives them the authority of experience, and that the authority of experience gets transformed into an authority that says "I know because I have been there..." (p. 93). Scott (1991) argues that when experience is taken as the origin of knowledge, the vision of the person who had the experience becomes the basis of evidence upon which an explanation is built, and the evidence of experience becomes evidence for the fact. "What could be truer", Scott states, "than a subject's own account of what he or she has lived through" (p. 777). Evidence of the experiences of those as cited in the literature review is embedded in the individual literature pieces.

Becker, Lambin, Longeway, Zaibert, & Pearson, (2003) argue that experience is reasonable to justify a statement if the statement is from an individual with relevant personal experience, the individual is trustworthy, and the statement describes the experience and does not in itself draw conclusions from the experience. Williams (1983) describes experience as the "fullest, most open, most active ... consciousness ... [that] includes feeling as well as thought" (p. 127). Williams argues that the grounds for reliance on past experience and present experience is therefore radically different, stating that the general usefulness of past experiences is "so widely recognised that it is difficult to know who would want to challenge it" (p. 127).

The literature, and my own 10 years experience, is reviewed, therefore, within the following context: a greater reliance on statements of past experience, as statements of experience, rather than reliance on the conclusions drawn from them.

3.9 Summary

Phenomenography and IPA, as a joint methodology, are not used in isolation but are used jointly and seamlessly in both the literature review and the interviews to extract and examine both the essence of the actors' understanding of industry certification and the essence of industry certification itself through the experiences of those actors.

The analysis of the literature follows in Chapter 4. The analysis of the interviews is the subject of Chapter 5.

Chapter 4: The literature review analysis

4.1 Introduction

As outlined in the previous chapter, this aspect of the research seeks to discover and interpret the actors' internalised constructs of reality of industry-based certification using IPA through interpretations of literature texts containing actors' experiences. Further, it seeks to interpret the institutionalised phenomenon itself using phenomenography, again through the interpretation of experiences in literature texts. Both phenomenography and IPA sorts data into *categories of meaning*.

4.2 Data-sorting and the emergence of categories

As mentioned in the previous chapter, a feature of phenomenographical data analysis methods is variance in practice (Åkerlind, 2005), which includes variance in data-sorting methods. One typical method described by Åkerlind is the sorting and re-sorting of interview transcripts into piles representing emerging categories of meaning. This data sorting method is likewise advocated by Berglund (2006). The data for this aspect of the research, the literature review and analysis, derives from interpretations of actors' experiences and perceptions of industry certification as recorded in texts. The researcher deemed it unworkable to physically cut up and sort these recorded experiences into such piles, therefore, an alternative data sorting method was adopted.

Multiple readings of literature pieces were made to allow the categories of meaning to emerge and form a mental picture to the researcher. The essence of what the literature contained was then written up as an annotated literature review. The broad categories were then coded using open coding. Lower-level categories (or themes) were then identified within each category using axial coding, and any further sub-themes were identified using selective coding (Flick, 1998; Orlikowski, 1993; Strauss & Corbin, 1990).

In the initial readings and write up of the literature, four broad categories of meaning emerged. These broad categories are:

1. Market and product perceptions (of the industry actors)
2. Programme models and assessment
3. Recognition
4. Programme implementation and administration

In the case of broad category three above, data in a lower-level theme, “‘Professional’ designation”, began to move away from the domain of *industry certification* and into the domain of the background context of industry certification. For purposes of clarity, therefore, the review of the two themes within this category (“Recognition”), appears in the “The background context of industry certification” section of this Thesis rather than included here. (The second theme within this category, “continued certification” also more correctly appears with “The background context of industry certification”, as it illustrates an aspect of the popularity of industry certification.) Similarly, a lower-level theme “Integration with academic institutions” within broad category two, “Programme models and assessment”, is also included in the “The background context of industry certification” section. In all cases, however, analyses of these themes, along with the researcher’s perspective, are included in Chapter 6, “Discussion, researcher perceptions, and recommendations”.

The following sections represent actors’ views of industry certification from the literature sources. As the literature is the predominant source of data for this study, I have not attempted to critique any of the literature, or agree with or refute any of these views apart from presenting relevant comments from my own experience where I deemed it was appropriate for clarity of context. These comments are presented in the third person as my own personal experiences in the phenomenon are also the subject of this study. Notes regarding the actor’s circumstances as may influence that actor’s conceptions are also included.

My own perceptions and arguments are presented in Chapter 6, “Discussion, researcher perceptions, and conclusions”, and follow the summary of data collected from interviews with industry certification actors in Chapter 5.

Figure 4. on the following page illustrates the fully constructed and interrelating categories of meaning hierarchy that emerged from an analysis of the literature review.

At the top level the essence of the individual perceptions and understanding of industry certification, and the essence of industry certification itself, are broken into four broad categories of meaning at the open coding level. These broad categories of meaning in turn break into themes within those broad categories at the axial coding level. These themes may further break into sub-themes, and so forth to the lowest level of detail.

It is at the lowest levels of the sub-themes, the selective coding level, at which each meaning is examined in detail in the following analysis.

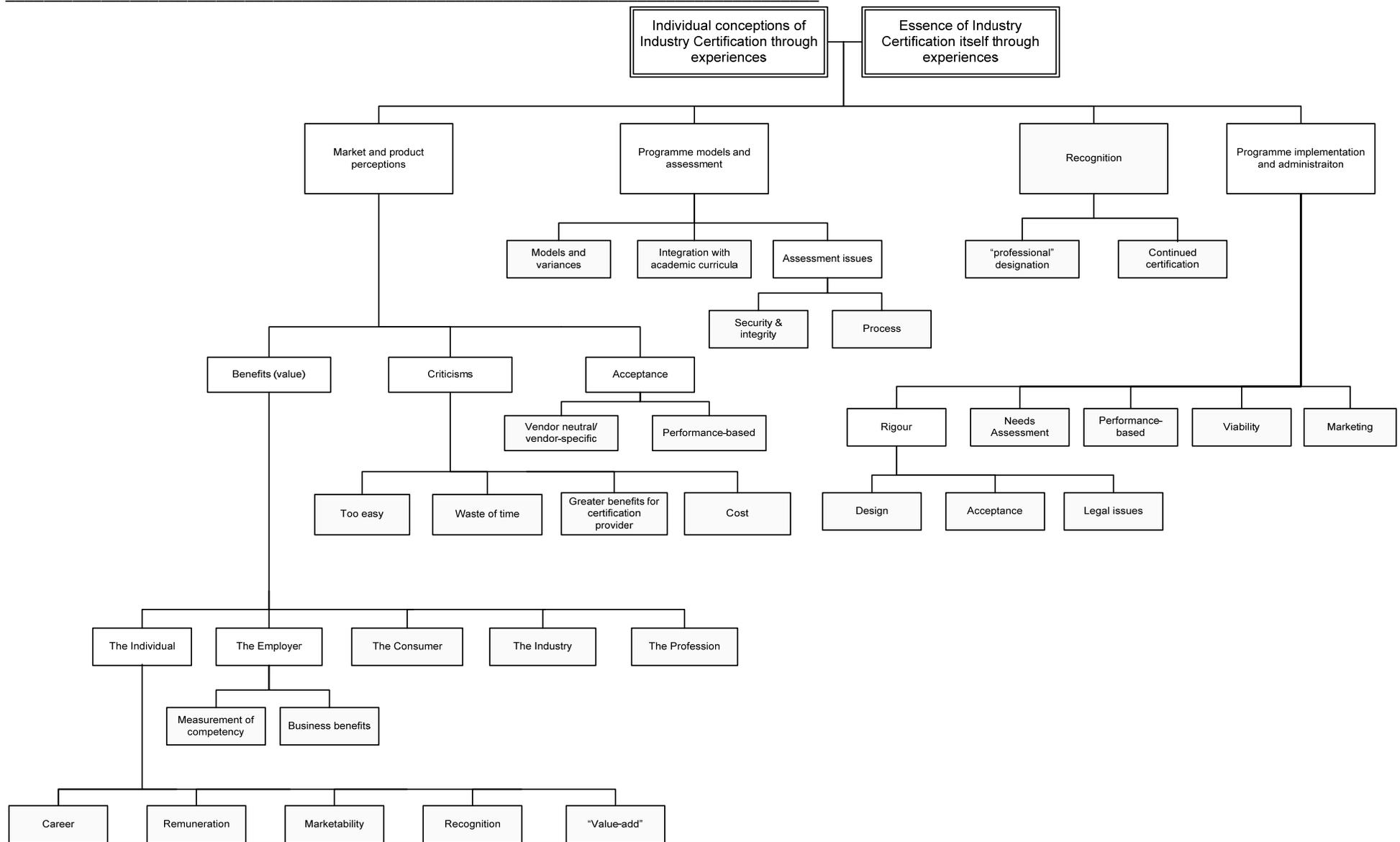


Figure 4. Construction of interrelated categories of meaning hierarchy

4.3 Broad category 1: Market and product perceptions (of the industry actors)

Three themes emerged within the broad category “Market and product perceptions”. These themes are shown in Figure 5, and are outlined in the proceeding sub-sections. The first theme, certification benefits, represents the value to certification holders and other stakeholders of certification. The second theme represents the criticisms of industry certification as perceived by industry actors. The third theme, represents the acceptance of the certification by the industry that certification represents.

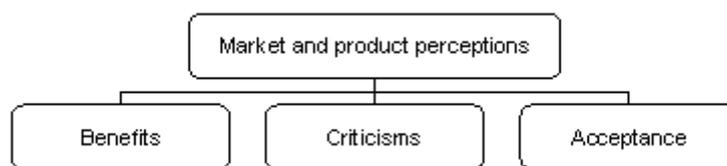


Figure 5. Themes within the category “Market and product conceptions”.

4.3.1 Certification benefits

Five sub-themes emerged from within this theme: benefits to the individual, to the employer (of certification holders), to the consumer (of the product or service that the certification is apposite to), to the industry (that the certification represents), and as a profession. These are illustrated in Figure 6.

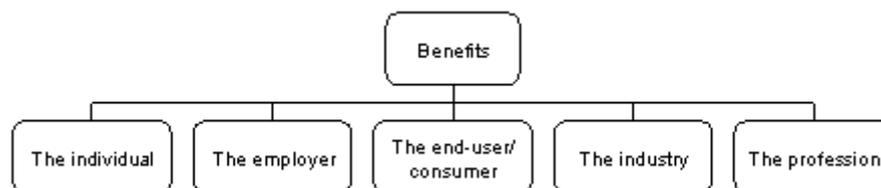


Figure 6. Sub-themes within "Certification benefits"

Benefits for the individual

At the lowest level, themes to emerge from within “Benefits to the individual” are; career progression and job diversification, remuneration, marketability (of the certification holder and their skills), recognition (of the certification holder as a knowledgeable, skilled professional and of their certification), and the “value-add” benefits (such as discounts on product, access to knowledge-

bases¹⁹, and other privileges associated with the certification). These are illustrated in Figure 7.



Figure 7. Sub-themes (lowest level) within “Benefits to the individual”

Au (as cited in “On the right track”, 1999), business development director of NTT Data Corp, Malaysia, says that certification provides career advancement, salary increment, job diversification, marketability in a highly-mobile environment, and worldwide recognition of expertise in a certain field (see also AAPNZ, 2002; Ortiz, 2003). **Dr David Cleland** (as cited in Ireland, 2003) Professor Emeritus of the University of Pittsburg, says that certifications, along with degrees and other qualifications are “hunting licenses that do not guarantee work but give a person the right to hunt for that work” (para. 1). Montante and Khan, 2001, state that “certification provides a greater sense of confidence in ... [the holder’s] abilities and a measure of professional expertise and understanding of job roles and products used in that role” (p. 371).

Many writers reviewed agree that while it does not *guarantee* the holder a job, a certification can, even without experience, “help them get a foot in the door” (Gorley, as cited in Alexander, 1998b, para.17). It assures the holder credibility (Brandt, 1998; Semeraro, as cited in Alexander, 1998b), and a hiring advantage (Robertson, 2003) as they are equipped with good marketable skills (Manecksha, 2002). A certification however, is more than just a catalyst for the holder obtaining that first job - it is the key to career advancement and new employment opportunities (Ash, as cited in Alexander 1998a; Au, as cited in “On the right track”, 1999; Bowman, 2002; Brandt; Eggert, 2001; Ireland, 2003; Robertson). **George Eggert** says certification provides a means by which professionals can be identified, hired, and attain career progression.

In 2001, George Eggert was a member of the Association of Information Technology Professionals, and is a past National President.

¹⁹ Databases of relevant facts, information, references, and discussion forums, usually on-line.

According to the Association of Administrative Professionals New Zealand Inc (AAPNZ) (2002), on the launch of their AAPNZ Certification in 2002;

certification is a statement of the skills you take with you from role to role. It gives value to those skills and recognises that you are a professional at the work you do and have a certificate to prove it (para. 2).

AAPNZ state that a certificate is “**your** chance to value yourself so that others value you” (para. 2), and that you are benchmarked to the standard required of the profession. According to **Carl Bowman** (2002), manager of CompTIA’s CIDA+ (Certified Document Imaging Architech) programme, in a discussion in which he notes the growth of document imaging certifications, a certification holder is a knowledgeable professional that “stands out from the crowd” (para. 13) (see also Nicholson, 2001). And especially in the case of performance-based certification, it demonstrates proven, technical abilities – a guarantee of competency within a specified range of skills (Brandt, 1998; Childers, 2001; Eggert, 2001). Robertson and Corbett (2004), following a scan of IT job vacancy advertisements, claim that it is clear that the preference is for certified applicants, especially the Microsoft MCP (Microsoft Certified Professional) and CompTIA A+ certifications (New Zealand Herald, 2004; SeekIT, 2004; as cited in Robertson & Corbett).

The AAPNZ literature is blatantly promotional of the AAPNZ certification and gives, understandably, no contrasting opinions. It does, however, present arguments for certification similar in nature and context to other literature reviewed.

Certification attracts significantly more compensation (Au, as cited in “On the right track”, 1999; Ortiz, 2003; Prencipe, as cited in Cegielski, 2004; Swanson, 2002; Cegielski, 2004). Swanson reports that bonus payments had increased for certifications but declined for non-certified technicians. **Peter Childers** (2001) claims that true, performance-based certifications accord a higher value and status than other types, saying that the individual holder receives higher levels of confidence, an increased recognition of competence, as well as prestige, leadership, and enhanced promotion opportunities.

In 2001, Peter Childers was Vice President of Learning for Red Hat's²⁰ performance-based certification programme which is promoted in the article reviewed.

Eggert (2001) says that certification has a value both real and psychological: real in that it is acknowledged by their industry, and psychological in that it gives the holder the feeling of having achieved a credible certification based on a common body of knowledge. The certificate provides the holder, he says, with evidence that they have a "specific level of knowledge or competence" (p. 2) in the industry. Certification too encourages self-development and continuing education (Brandt, 1998; Manecksha, 2002), is proof that the holder's skill-set is at the "cutting edge" of technology, ("Internet security systems", 2002; Robertson, 2003), and is an opportunity to build skills that are in demand thereby giving the holder an employment advantage (Robertson). **Michael Brandt** says that a certification programme is "designed to define technical competency and foster excellence" (p. 38).

Brandt offers no discussion on the criticisms of certification. His article is an endorsement and promotion of the ESD (Electrostatic Discharge) certification. His arguments, however, support, and are supported by, many others. In 1998, Michael Brandt was a publicity consultant to the ESD Association.

Some writers take care to put the value of certification into perspective. Daly (1992) cites **Richard Koenig**, the then head of then new International Information Systems Security Certification Consortium Inc. ((ISC)²) who says that certification is a starting point and "not a Superman designation" (para. 12). Cosgrove (2004) points out that certified individuals have competence in using the products of the certifying company, and, according to Au (as cited in "On the right track", 1999) they may not provide the skills required for a particular job.

This is obviously so for vendor-specific certifications, but the sponsors of vendor-neutral certifications may not necessarily agree (see Eggert, 2001). See discussion on vendor-specific and vendor-neutral certification later in this Chapter (Section 4.3.3).

²⁰ "Red Hat" is a Linux (Operating System) vendor.

According to The Institute of Management and Administration (2005), certification holders are getting a lot more from their certification than was originally anticipated. Brandt (1998) argues that certification “demonstrates competency and encourages self-development and continuing education. It goes in the ‘plus’ column for performance reviews, career advancement and new employment opportunities” (p. 38).

Certification holders also receive many “value-add” benefits designed to attract candidates to a given certification programme, and to retain the certification holder in their community. These value-add benefits include, to varying degrees, and not in the entirety of this list, within any given programme (Brandt, 1998; Childers, 2001; Eggert, 2001; G. Houston, personal communication, May 13, 2005; Microsoft Learning, 2005; Novell Training Services, n.d.; Novell Brainshare, 2005; Ohlhorst, 2005; D. Shaw, personal communication, September 1, 2005):

- access to additional technical support
- access to professional resources suites and beta evaluation software
- access to beta training and online training resources
- product discounts
- use of credential logos on business cards, résumés, responses to RFPs (Requests for Proposal), and other documents
- magazine or other like subscriptions
- member Website and knowledge-base
- regular symposia (which includes the certified community as a communication conduit from end-user back to the product manufacturer)
- merchandise

Such “value-adds” serve as inducements to applicants to join a given certification programme, to stay current, and to participate in the certified community’s activities, forums, bulletins, communications, etc.

Benefits for the employer

Further themes within “Benefits for the employer” were discovered: as a measurement of the competency of job applicants including disagreement over the emphasis placed on certification as a measurement of competence, and

having certified staff as a point of marketability (described as business benefits). These are illustrated in Figure 8.



Figure 8. Lowest level themes within “Employer benefits”

According to AAPNZ (2002), certification is “a system that employers can have confidence in” (para. 9). Manecksha (2002) says that just as a bachelor’s degree is no longer considered the minimum requirement needed for getting a job in IT, that it is only one criterion, certification has become a vital and important *indicator* of the holder’s performance and is *one* criterion for appointments. When hiring professionals, Alexander (1998a) says that IT managers want to be sure they are “getting their money’s worth” (para. 1), and, in some areas of IT, certification may alleviate confusion in assessing which skills an applicant has (Alexander, 1998b).

Manecksha is not profiled in the article. The article has a strong marketing bias.

Gary Devoe (as cited in Alexander 1998a), an IT manager, states that certification is “pretty important” if one needs their new hire to “hit the ground running” (para. 3). According to **Vanessa Swatz** (as cited in Alexander, 1998a), Senior Director of global marketing at Oracle, an unbiased certification test is the best way to make sure one has the right people. Many others agree saying that certification is a verification of someone’s knowledge and requisite skills (Ash, as cited in Alexander, 1998a; Au, as cited in “On the right track”, 1999; Bean, as cited in Martinez, 2005; Bowman, 2002; Eggert, 2001; The Institute of Management and Administration, 2005; Project Management Institute, 2005; Rainey, 2001; Robertson, 2003; Sagar, as cited in Cegielski et al, 2003).

Others, however, have alternative views, saying that, in the main, certification has never been important (Ford, as cited in Alexander, 1998a), that employers are looking for more work experience (Alexander; Ford, as cited in Alexander), and, especially in the early-mid 1990s, certified professionals often lacked real-

world experience (Cocks, 1993). **Edward Cocks** cites the case of a large local government who had 20 CNE applicants but only four with experience, and then only marginal. Nonetheless, he says, some corporations, for example Citicorp, who at the time employed more than 200 CNEs, have made certification a prerequisite to employment.

In 1993, Edward Cocks was a network specialist with 13 years experience. He had recently completed a CNE (Certified Novell Engineer).

Koenig (as cited in Daly, 1992), says that certification benefits for employers include the identification of individuals with specific expertise and who meet stated criteria, as well as applicants who can be assessed based on their achievement of a professional certification *rather than their ability to write a convincing resume*. Daly cites others who warn against “using it as a crutch” (para. 17), including **David Stang**, Chairman of the International Computer Society Association, who says that there is no substitute for experience, that ongoing education should be emphasised. **Ed Foster** (1997a), however, says that experience may not give the answers either, that his three years experience counted for nothing outside the company he worked for, and that certification was another way of getting educated, and passing the exam proved he could master the lessons. Foster outlines his interview with a network manager, who, after many years of experience working with UNIX, Windows, and NetWare²¹ found himself looking for another job. Despite having experience he found that companies were minimizing risks by hiring certified candidates over experienced candidates.

Bean (as cited in Clancy, 2003) says that recruiting and developing people has always been a “two-part process” (para. 3). Even an academic qualification, he says, is “no substitute for experience” (para. 3), that employers look for a qualification, and then look for experience in the resume and through the interview. Bean says that the role training and certification plays, is “equipping people from a ground-level, grassroots academic and theoretical perspective” (para. 4).

²¹ UNIX, Windows, and NetWare are computer and/or network Operating Systems.

Alexander (1998b) notes that in the burgeoning Web development market, certifications help alleviate the confusion of knowing which skills are required and which job candidates possess those skills. Alexander cites **Caroline Rose**, former Novell Education Senior Vice President and now CEO of USWeb Learning, who says that certification will bring clarity to Web-related jobs allowing employers to identify and define Web expertise. Furthermore Gorley (as cited in Alexander), says that previously “everybody who ever did a Web page for a friend claims to be a Webmaster” (para. 18). **Bob Cullifer** (as cited in Alexander), Executive Director of the National Association of Webmasters, says that certification will define an occupation and legitimise the title that includes technical, business, and content-management skills (see also Himmelsbach, 1997). Eggert (2001) claims that certification leads to increased skills and improved productivity, thereby leading to personal and professional development.

Lenora Knapp and Gallery (2003) warn that while a certification demonstrates that at a given point in time the individual met the standards and requirements set by the certifying body, it does not guarantee competence. Mason (2003) points out that Microsoft’s own research shows that their MCSE is not a replacement for on-the-job experience. Ortiz (2003) states that “most experts agree that certification is definitely no substitute for extensive, hands-on experience” (p. 178).

Cleland (as cited in Ireland, 2003) says that while few people, however, question certification as a basis for evaluating competence, some companies, professional societies, and individuals are beginning to challenge this and other value factors. According to Williamson (as cited in Cegielski, 2004) employers place considerable importance on professional certifications during the job candidate selection process. Cegielski’s research into the perceived value of Information Systems Network (ISN) certifications, however, found that in the candidate selection process, HR professionals placed a greater value upon certification than did IT professionals.

In 2003, Lenora Knapp was President of Knapp & Associates International Inc., a consulting firm serving the certification community. (Michael Gallery was interim Chief Executive Director, American College of Emergency Physicians).

Despite previous research to the contrary (not referenced in source), the majority of HR professionals believed that a certified administrator was on average more competent, with the entire group saying that a certification minimised their responsibility for candidate assessment, and many saying that a certification attested to the candidates' skill level (Cegielski, 2004). On the other hand, only four (of 27) IT professionals believed that certification correlated to ability, with none indicating that certification was a justification for the hire. Cegielski acknowledges the following limitations in the research: First, ISN certifications are generalised into a single unit, and acknowledging that results may differ depending upon the specific certification. Second, the survey instrument included only eight consideration criteria, and acknowledging that there may be others not represented. Cegielski concludes that "certification is not a robust predictor of ability" (p. 105), but nevertheless many firms place a great emphasis on external credentials during candidate selection for IT positions.

Cegielski et al., (2003) also cite Williamson who states that "professional certification is one of the most common tools used by employers to measure the capability of a potential hire" (para. 3), and Sagar who states that certification will "delineate an expert level of knowledge from a non-expert level of knowledge" (para. 7). While Cegielski et al. state that certification is one criterion that employers seek when hiring (see also Cocks, 1993), and while many employers assume that a certified network professional is better able to manage network resources, their research found that end-users of networks administered by certified professionals did not have higher perceptions of the network than did end-users of networks administered by non-certified technicians. Furthermore, they found that there is no significant difference in either the perceived usefulness or ease-of-use of the networks. They conclude that employers should develop an aggregate means of assessing capabilities, that certification is one criterion not warranting excessive consideration, and should not be the sole basis for hiring decisions. Cegielski et al. acknowledge

the following limitations of their research: The research utilises one acceptable means of assessment, acknowledging that there are other methods; the study considers only two types of certifications; the study included only businesses in the financial services industry, acknowledging that other industries may result in different findings; and finally, the study assumes a positive level of end-user self-efficacy.

Even given the reservations mentioned above, Ireland (2003) lists a number of benefits for employer organisations, including employees with a consistent understanding of their profession, and using certification as *a point of differentiation from their competition*.

In 2003, Dr Lewis Ireland was President of the American Society for the Advancement of Project Management (ASAPM).

Martin Bean, (as cited in Martinez, 2005), says that there was a skill shortage in the later 1990s, and certification was one of the few ways employers could qualify résumés at the primary level. Today, he says, some employers who felt that certification had driven up salaries are demanding experience along with knowledge. Bean lists several ways corporations can measure a return on their certification investment; a decrease in employee turnover, improvement in client retention, an increase in productivity, faster promotion for employees, and reduced hiring costs (see also Ireland, 2003; Robertson, 2003). **Kristin Robertson** also lists increased customer service and satisfaction levels, attaining marketing leverage, and a meaningful way to invest in staff by demonstrating their value. According to **Richard Starnes** (2004), having certified staff also lowers risk and exposure to third parties.

In 2003, Kristin Robertson was President of K R Consulting Inc., and a consultant and trainer for the Help Desk and Technical Support industry. In 2004, Richard Starnes was director of incident response at the Managed Security Operations Centre at Cable & Wireless.

Benefits for the consumer

Penny Lightle (as cited in Bowman, 2002), Director of Technology for Imaging Office Systems, says that increasingly, RFPs (Requests for Proposals) are asking

how many team members are certified, as buyers “are assuring themselves that they will be working with knowledgeable professionals” (para. 4). This is indeed one reason organisations have their personnel complete certification programmes. **Tim Dilley** (as cited in “Informatica”, 2001), Senior Vice President of Informatica, says that the goal of their certification programme is to “authenticate genuinely expert individuals who can help customers derive optimum value from ... projects” (para. 4). Ireland (2003) says that consumers who expect their products and services to be delivered in a consistent manner that meets professional standards benefit from using certified professionals as they receive greater value through proper design and implementation. He believes that certification delivers this and other benefits at a greatly reduced cost. Additionally, certified technicians have access to additional technical support when needed (see also Ohlhurst, 2005). Ohlhurst says, referring to VoIP²² certifications, that certification often results in faster deployment with fewer problems as certified technicians prove to be the best reliable source.

Frank Ohlhurst is not profiled in this article. The article is promoting VoIP certifications.

Morgan (2005), assistant professor of information technology at Duquesne University, Pittsburg, PA., in a paper proposing examination of software professionals for competency, posits that “certification, based on a generally accepted body of knowledge, is needed for clients, as well as the general public, to trust software professionals ...” (p. 129).

Benefits for the industry

Morgan (2005) further says that the software engineering industry has become “a labyrinth of various practices and procedures” (p. 129), and that the industry needs a way to verify the skills that are directly transferable to practice (Turner, as cited in Morgan). Other trusted industries examine individuals for professional competency, she says. According to Brandt (1998), certification fosters excellence, and raises the entire overall competency level within an industry, ensuring that industry has properly trained and qualified technicians.

²² Voice over Internet Protocol (voice over the Internet).

Ireland (2003) says that certification enhances the stature of the industry, and provides opportunities for growth and professional development. Once a certification has matured, he says, employers may include certification as a job requirement. Robertson (2003) says that certification is a demonstration of professionalism within the industry. Certification, she says, “is the outward and visible sign of commitment” (para. 2). Rainey (2001) believes that industry stakeholders, including employers and the consuming public, benefit from an objective, fair, and meaningful system of certification. He says that industries have a right to expect that its workers are qualified, and a certification system guarantees a supply of qualified professionals.

Kenneth Rainey is not profiled.

Benefits for the profession

Rainey (2001) believes that a profession has an obligation to accept accountability for the work its members perform, and the skills arising from an objective, fair, and meaningful certification. He points out too that while their profession cannot require an individual to become certified they would fulfill its ethical and professional responsibility by providing a process by which a professional could become validated, saying that certification strengthens a profession by assuring that certified professionals meet the same minimum standards, otherwise the profession is weakened, bringing into question the legitimacy and ethics of that profession (Hayman, as cited in Rainey). **Judith Hale** (2000) says that professional associations develop certification programmes to counter an absence of other relevant accreditation programmes and a lack of professional standards. Robertson (2003) argues that certification gives commitment and dedication to a profession.

Judith Hale claims 30 years experience consulting in the set-up and administration of certification programmes.

Knapp and Gallery (2003) point out that professional associations have been at the forefront of the explosive growth of professional certification programmes over recent years (see also Gilley, 1988; Peluso, 2000) often making these associations “standard bearers of their professions ...” (p. 28). Ireland (2003)

says that professional associations derive value from conducting certification programmes by being recognised by the public and industry as leaders in their field.

While the benefits and advantages of certification are considerable and are heralded by many, there are others who voice criticisms of industry certification.

4.3.2 Criticisms

Four themes at the lowest level emerged from within the sub-category “Criticisms” as follows: Industry certifications are too easy to attain, they are a waste of time, they provide greater benefits to the provider than they do for the holder, and the substantial cost of attaining a certification. These are illustrated in Figure 9.

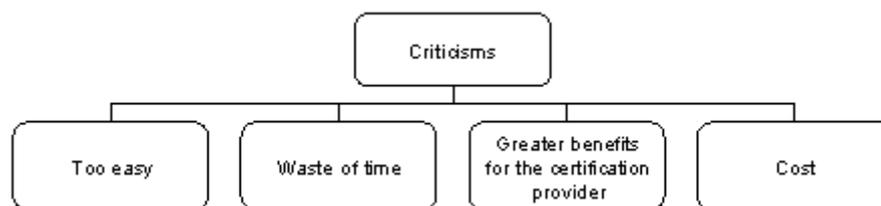


Figure 9. Lowest level themes within “Criticisms”

Many people with experience say that once one has experience, gaining a certification is a waste of time, as a *piece of paper* cannot compare with that experience (see Gorley, as cited in Alexander, 1998b; Thurman, 2001).

In the researcher’s experience this was an often voiced criticism.

Others say certifications have no value: **Frank Semeraro** (as cited in Alexander, 1998b), described by Alexander as a Web professional, while he believes that certification gives you “more credibility in the industry” (para. 19), says that some certifications are given away “to anybody who takes classes” (para. 21). Robertson (2003) says that some managers believe that certification “is only worth the paper it is printed on” (para. 11), warning that certification, in itself, cannot ensure a good hire, nor make all “service problems go away” (para. 11).

Foster (1997b) uses extracts from his “Gripe Vine” Web-based forums (Foster, 1997a). He quotes forum contributors who say that certification vendors get

more value than do certification holders. One contributor says there are three reasons for expensive certifications: to ensure that one invests so much in certification that they will never recommend any other product; to enable certification vendors to claim large numbers of certified professionals supporting their products; and the money it brings the vendors.

Robertson (2003) argues cost as a disadvantage, but believes that cost is significantly outweighed by the benefits. Cisco's CCIE (Cisco Certified Internetworking Expert) laboratory-based exam costs in excess of \$US1,000.00, and may require considerable travel to a testing centre (Cisco Systems, 1992-2005; Joss, 2001). There is also a cost to continuing re-certification or certification re-validation to be considered. Ireland (2003), however, says that few people question either the cost of or return on investment in certification, as the benefits far outweigh the cost.

4.3.3 Acceptance

Within the theme "Acceptance" two themes emerged at the lowest level: whether the certification is vendor-specific²³ or vendor-neutral²⁴, and performance-based assessment (as opposed to knowledge-based assessment). These are illustrated in Figure 10.

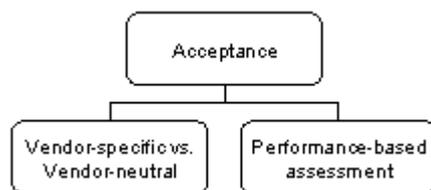


Figure 10. Lowest level themes within "Acceptance"

Vendor-specific/Vendor-neutral

Much debate in the literature centres on vendor-specific versus vendor-neutral certifications. In 1993, Cocks (1993) looks forward to the establishment of generic, vendor-neutral certifications as most certifications only measured competence in the use of a specific product (see also Cosgrove, 2004), and until

²³ Certifies knowledge and skills for a specific sponsor's product/s, e.g. Microsoft Cisco.

²⁴ Certifies knowledge and skills across non-specific products and disciplines.

then, personnel managers should increase the experience requirement for job candidates.

Many vendor-neutral certifications, however, do *not* verify experience. CompTIA's A+ certification, for example, can be gained by candidates with no field experience whatsoever.

Some training centres offer a mix of both vendor-specific and vendor-neutral programmes in order to be able to offer whatever technology certification the market is embracing (Rose, as cited in Alexander 1998b). **Donna Senko** (as cited in Alexander), Microsoft's Group manager of certification, says that vendor-neutral certifications provide a stepping-stone to (their) vendor-specific certification.

This comment is obviously skewed to make vendor-neutral certification appear a base level qualification while Microsoft's vendor-specific certification is a higher-level qualification. While Microsoft's certification is directed towards support of their products, Novell, however, along with their own vendor-specific exams, has always embraced other technology inside their certification programmes, as well as vendor-neutral content (see Alexander, 1998b).

Cosgrove (2004), in a complementary comparison of academic and industry-based qualifications, states that certified individuals have competence in using the certifying company's products.

This comment appears to ignore the objectives of vendor-neutral certification. Cosgrove's mis-made point, however, is that industry certification is *product-usage* centric, be that vendor-specific or vendor-neutral. As Eggert (2001) relevantly points out, holders of vendor-specific certifications may have inappropriate skills when transferring to work on a different product.

The ICCP (Institute for Certification of Computer Professionals) claim a vendor-neutral certification that covers 80 percent of the industry as a counter to the inundation of vendor-specific certifications, and which is "somewhat unique" (Eggert, 2001, p. 2), as it includes testing for management-oriented skills.

Bean (as cited in Clancy, 2003) believes that one of the reasons for the huge growth in vendor-neutral certifications over the previous few years is that there is a "common set of skills that straddle multiple technologies and multiple

[product] vendors ... typically at entry level (para. 13). This, he says, would otherwise require redundant testing across these multiple vendors (certification sponsors).

Performance-based assessment

In 1993, Cocks (1993) claimed that technical certification was “all the rage” (sub-title). Cocks writes that he looks forward to the establishment of performance-based certification. In 2001, **Molly Joss** (2001) noted a trend towards performance-based certifications - a trend, she says, likely to become a standard, as many training programmes teach candidates how to pass the tests, not how to perform in the real world.

In the mid 1990s, while many instructors were *teaching* for the real world, the focus of many students, however, was indeed on simply passing the test.

Creativepro.com (2005) describes Molly Joss as a freelance writer, book author, and trainer with decades of experience.

Dr. Amir Elanhi (as cited in Joss, 2001), President of Computer Analytics Inc, observes that “something is broken ... when the individual feels compelled to cram for the exam rather than learn actual skills” (para. 18). “As the IT world matures”, Joss says, “we’re realizing that knowledge does not necessarily equal capability” (para. 4). According to Ireland (2003), knowledge-based examinations measure candidates’ understanding of vocabulary, a body of knowledge, and some practices, whereas performance-based certification, which may include a sample of a candidate’s experience, infers an ability to perform tasks at a given level, giving a greater degree of assurance and value.

Novell claim that their “Practicum” exams are scenario-based where students apply their knowledge to solve real-life problems, showing they know *how* to do it and *can* do it (Novell Training Services, n.d.; Seamons, 2000). They claim the testing server uses virtual machine technology where a single workstation can remotely access several virtual environments running multiple operating systems. Cisco’s CCIE includes an eight-hour exam that requires the candidate to build a series of complex networks to certain specifications including all devices residing in the network (Cisco Systems, 1992-2005). Childers (2001)

claims the RHCE (Red Hat Certified Engineer) exams programmes measure the candidate's ability to *use* the technology to carry out actual tasks, that it is a "direct, simple, and fair method of testing ... and you become a person with valuable, proven technical abilities – almost a guarantee of competency" (para. 3). Cognos too claim their certification tests how well a candidate knows, *and can use*, their product (Cognos Global Customer Services, 2005). Neither Childers nor Cognos offer any material to substantiate their claims.

Childers (2001) mentions other true performance-based certifications: Cisco's CCIE certification, Novell's CDE (Certified Directory Engineer), as well as certifications recently launched by Hewlett-Packard²⁵, Juniper Networks²⁶, and "a few other IT OEM's"²⁷ (para. 9). According to Bean (as cited in Clancy, 2003), there is no doubt that testing was changed to look for more practical applications once employers started to express a desire for more experience rather than just straight theory. He says that the turning point in this trend was the "paper" certifications debate of a decade ago referred to in Chapter 2.

Certiport, a leading provider of global, performance-based certification programmes (Certiport, 2001), and SkillCheck, a provider of pre-employment testing and educational skills assessment (SkillCheck, 2004), together, and between them, have introduced vendor-neutral, performance-based certifications in an effort to introduce a worldwide standard of computer literacy (see also Michael & Thomas, 2004). Joss (2001) mentions the Field Certified Professional Association who had recently completed work on accreditation standards for field certification exams, and was beginning work on establishing testing centres for hands-on testing. Brainbench Employment Testing offers certifications and testing but focused on specific job roles that target skills assessment and job function rather than being related to specific technology usage or subject matter. Employers, for pre-hire testing, and individuals for acceleration of learning, to measure training, and leading to

²⁵ Hewlett Packard Development Company, L.P.

²⁶ Juniper Networks, Inc.

²⁷ Original Equipment Manufacturer, a company that typically builds products or components that are used in products sold by another company (often called a value-added reseller, or VAR) based on designs of the VAR. A VAR is sometimes called an OEM, despite this being a misnomer, and a complete reversal of the literal meaning of both terms (Wikipedia, 2006b).

certification, can self-take the exams (Bean, as cited in Clancy, 2003; Brainbench Employment Testing, 1998-2005).

4.4 Broad category 2: Programme models and assessment

Three themes emerged from this broad category: certification programme models and variances, integration with academic curricula, and assessment issues. These are illustrated in Figure 11. This section reviews the literature associated with themes one, programme models and variances, and three, assessment issues, and are outlined in the following sub-sections. Theme two, integration with academic curricula, was presented in Chapter 2, Section 5; “Background context of industry certification”.

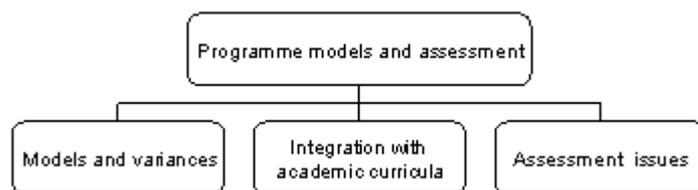


Figure 11. Themes in broad category 3, programme models and assessment.

4.4.1 Certification models and variances

Context

The analysis within this theme is a summary of certification programme models to illustrate the variances in programme design and delivery, including several specific examples. This study within this category does not enter the domain of teaching or learning, as a certification programme centres on the path a candidate takes to complete the programme and pass its assessment criteria. The analysis of this broad category therefore remains within this domain. Teaching, and learning is a by-product of the requirement to complete the programme, and may range across the broad spectrum of generally accepted delivery formats.

Variance of models

Most programme models comprise a learning path, a knowledge-based and/or performance-based examination or series of examinations, and compliance with

a code of conduct. There are many additions and variances to this basic model. This is reviewed in this sub-section, and illustrated in Figure 12 at the end of this sub-section.

Steven Peluso (2000), corporate counsel for Professional Examination Service, New York, says that a professional certification identifies the competence an individual must have at an entry level, with many certifications having advanced levels for specialised professionals. A number of certifications, especially in industries other than IT, require candidates to achieve a formal academic qualification, show evidence of additional learning, or show evidence of a work history (Brandt, 1998; "ICPM offers manager credential", 2005; "Internet security systems", 2002; (ISC)², n.d.; Peluso; Project Management Institute, 2005), or attendance at a workshop (Go Certify, 2003-2005). AAPNZ requires the certification candidate to be a member of the association and provide service to it (Association of Administrative Professionals New Zealand Inc., 2002), and the ESD Association certification requires peer endorsement (Brandt, 1998). The ASAE (American Society for Association Executives) certification includes what is described as an *intensive review* leading up to the exam (Graham, 2005).

Many certifications *recommend* a period of experience, some *require* an experience component (Brandt, 1998; Feature Driven Development, 2004; "ICPM offers manager credential", 2005; "Internet security systems", 2002; (ISC)², n.d.; Peluso, 2000; Project Management Institute, 2005). The ICCP certification requires 120 hours of continuing education every three years.

Some certifications require the candidate to subscribe to a code of conduct or code of ethics (Go Certify, 2003-2005; (ISC)², n.d.; Project Management Institute, 2005). Some, especially CEH (Certified Ethical Hacker), require a background check (Go Certify, 2003-2005; Peluso, 2000). Some certifications accept other designations and certifications as "credits" towards their certification (Himmelsbach, 1997; Schick, 2004).

Most certifications require recertification or continuing certification updates, in a variety of ways, especially vendor-specific certification in line with new product releases (see especially "Internet security systems", 2002). Some

include requirements to maintain credentials in good standing (“Internet security systems”, 2002; (ISC)², n.d.).

Specific examples

AAPNZ certification provides a measurement of skills over four areas of competence. First candidates are required to achieve a formal qualification at Level 5 or above. Second they must show evidence of 25 hours of informal learning over the previous five years. Also required is evidence of a work history, paid or unpaid, full or part-time for 1200 hours over the previous two years. Candidates must become a full or affiliate member of, and provide service to AAPNZ. Certified persons must each year undertake four hours of informal learning and attend 50 per cent of group meetings to maintain certification. (AAPNZ, 2002.)

The ESD certification programme has a two-level, four-step process based on experience; nine years work experience for an engineer and six years for a technician, an education content, peer endorsement, and a series of examinations. Annual recertification is required (Brandt, 1998).

The FDD (Feature Driven Development) certification illustrates a hierarchical structure: One must first certify at the *aware* level, then, before they can *practice* they must certify at the *foundations* level. Before one can *consult*, one must certify at the *practitioner* level. The top tier is a consultant certification (Feature Driven Development, 2004).

The Informatica certification claims no classes are required, the exam having its own on-line study guide outlining the subject matter, and claim their goal is not to confirm basic competence but to “authenticate genuinely expert individuals” (Dilley, as cited in “Informatica”, 2001, para. 4).

The (ISC)² Web site lists the following requirements prior to taking the CISSP (Certified Information Systems Security Professional) examination ((ISC)², n.d.):

- Subscribe to the (ISC)² Code of Ethics.
- A minimum of four years direct full-time experience in one or more of the 10 domains of the CISSP Common Body of Knowledge or a Masters

Degree in Information Systems Security from a National Centre of Excellence.

- The CISSP Certification examination consists of 250 multiple-choice questions with up to six hours to complete the examination. Ten CISSP information systems security test domains are covered in the examination pertaining to the Common Body of Knowledge (Cosmos Security, 2003).
- Recertification is required every three years with requirements to maintain the credentials in good standing.

The ICPM certification programme includes emphasis on interpersonal skills, project management, decision-making, and team-building (“ICPM offers manager credential”, 2005).

The Project Management Institute (PMI) administers a globally accepted, rigorous, examination-based, professional project management certification. The certification is two-tiered, a basic Project Management Professional (PMP®) and a higher-level Certified Associate in Project Management (CAPM®). To be eligible for the PMP certification, candidates must first meet what is described as “specific education and experience requirements”, agree to adhere to a code of practice, and pass a multiple-choice examination “designed to objectively assess and measure your ... knowledge” (Project Management Institute, PMI Certifications, para. 3). There are two categories of the CAPM certification requiring the following:

- Category 1: A baccalaureate or global equivalent degree. Category 2: A high school diploma or equivalent secondary school credential (but not a degree).
- Category 1: A minimum of 1500 hours of project management experience within five process groups. Category 2: A minimum of 2500 hours of project management experience within five process groups. Project dates must represent at least two years of non-overlapping experience within a three year period.
- 23 contact hours of project management education across eight project management areas.

Typical and less typical certification programme elements

The following model, Figure 12, illustrates those elements of certification programmes that represent typical elements (typically found in a certification programme), and those elements that are non-typical (those elements not found in all certification programmes). These elements were extracted during multiple scanning of the literature and selective coding within this theme.

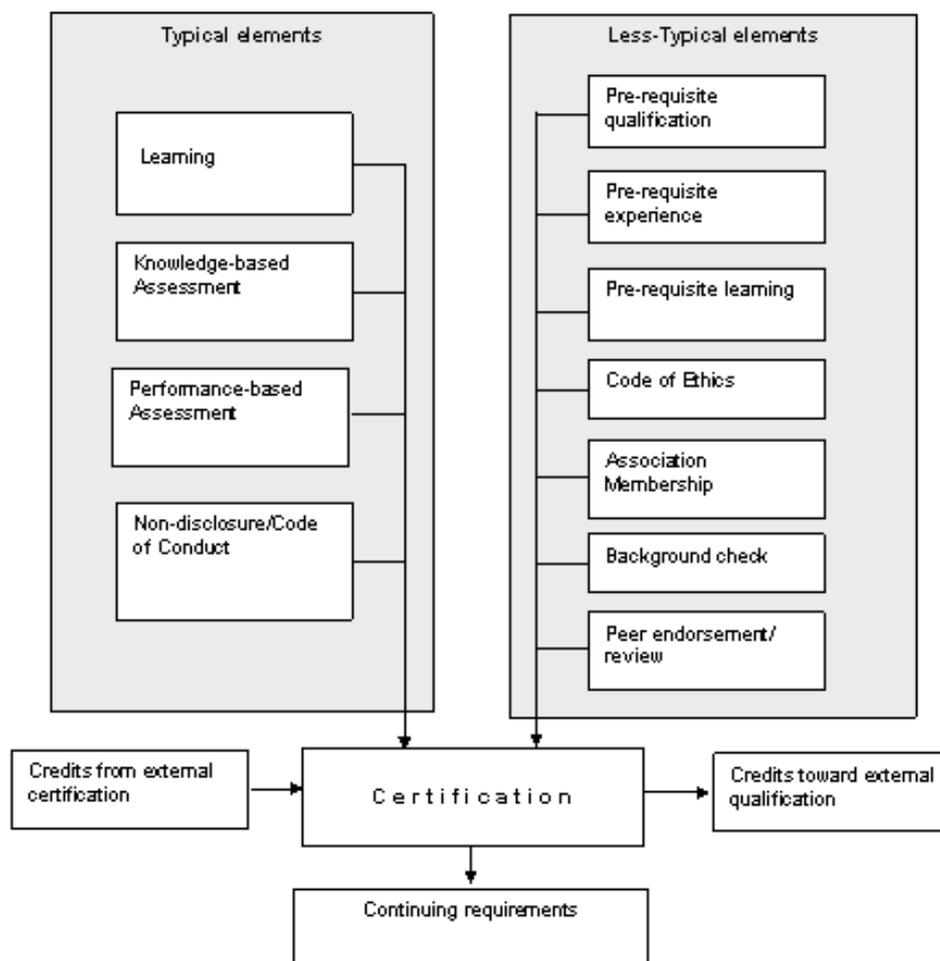


Figure 12. Typical and less typical certification programme elements

4.4.2 Assessment issues

Within the theme "Assessment issues", two themes emerged at the lowest level: security and integrity, and assessment process. These are illustrated in Figure 13, and are outlined in the following sub-sections.



Figure 13. Lowest level themes within “Assessment issues”

Context and preamble from the researcher’s experience

Academic-based assessment appears to make the assumption that instant feedback of the results of exams is not a priority, whereas with industry-based certification assessment, instant, on-line feedback of results appears to be the norm. This analysis assumes the latter.

Certification Testing Delivery Organisations

The two major exam delivery organisations are Pearson VUE and Thomson Prometric. There are others, for instance CATGlobal who provide a fully online testing programme. The researcher has had past association with these three organisations. CATglobal, however, and others, do not feature as prominently.

Testing Procedures, Payments and Commissions

Exam candidates book to take an exam by 0800 number, online, or contacting the exam centre directly. Bookings are centralised with the exam provider. Payment is required in advance, and varies depending upon the exam taken. A commission is paid to the exam centre.

Typical security is very high-level. When a candidate checks in to take the exam, two forms of ID must be sighted, including one with a photograph. Thomson Prometric requires “the optional use of digitized photos and fingerprints, in addition to the standard photo I.D. & signature verification, to fully authenticate a candidate” (Thomson Prometric, 2005). Candidates must leave all bags, jackets, and hats with the test centre administrator; there must be a secure area to keep this property. Nothing is allowed into the exam booth except pen and note paper - all note paper must be returned to the administrator afterwards. Each testing machine is required to be under visual observation or CCTV surveillance. In some high-stakes instances, video tapes

may be retained for 30 days (Thomson Prometric). The technology platform has an equally high level of security: "Testing centers have a dedicated testing network, with a physically secured file server and a [dedicated] test center network that prevents running any external applications" (Thomson Prometric).

Exams are downloaded in advance and the workstation locked to prevent access to anything else on the network. On completion of the exam results are automatically displayed on the testing monitor and directed to a printer.

Security integrity

Donovan (2003) says that it is crucial for certification providers to maintain the public perception of their certification's integrity. Numerous measures, he says, have been applied in recent years to underline the robustness of certifications from tighter controls to new testing methods. In January 2003, Microsoft won a case against Robert Keppel who ran a "brain-dump" site selling exam questions. Keppel received a prison term of one year and one day, was ordered to pay Microsoft \$US500,000, and was subject to three years supervision on completion of the prison term (CertCities, 2003; Donovan, 2003). Pearson VUE are closing down online scams purporting to guarantee certification without the need for an exam (Donovan). **Susan Vantor** (as cited in Donovan), Senior Marketing Manager, Oracle, says they actively investigate both cram sites and cheat sites and take it further if needed. According to Donovan, certification providers have invested heavily in new technologies and methodologies for exams to make cheating as difficult as possible by improving the intelligence of questions, using adaptive testing techniques, scenario-based questions giving a problem to solve, a huge bank of questions making it unlikely that anyone will sit the same test.

Novell's adaptive testing technique is a simple concept, but difficult to implement (Donovan, 2003). The exam delivery system alters the question asked based on the speed and accuracy of candidate responses. If a candidate is getting the answers correct the system will change the subject, if incorrect or the candidate is answering slowly, it will stay on the subject. The exam may present only five questions for a pass or a fail, or as many as all 50 questions.

Donovan (2003) says that other measures include greater control and stringent standards over who can deliver training (“authorised” training centres), including stripping trainer certification for breaches of rules, and handwritten exams ((ISC)², as cited in Donovan). Donovan says it is difficult to police non-authorised training centres as these may just be cramming centres. Candidates should investigate the integrity of the training centre before committing to taking training. Childers (2001) states that it’s “pretty hard to cheat on a performance-based exam. RHCE’s²⁸ tend to be judicious about what they reveal for ethical and professional reasons” (para. 13). Childers says that by and large the certified community have proven to have enormous integrity. He says that in addition to this, exam scenarios change frequently.

Many certification programmes require a confidentiality, non-disclosure, or code of conduct that includes a non-disclosure agreement signed by exam candidates (see Microsoft Learning, 2004; Netwind Learning Center, n.d.).

Foster (2003), outlines what he describes as “the darker side of certification” (Title) outlining the following security issues:

- Before;
 - Arranging someone to take the test for you.
 - Obtaining questions prior to the test (“brain-dump” sites).
- During;
 - Having unauthorised materials during the test.
 - Receiving help from someone during the test.
 - Leaving the test room to consult notes etc.
- After;
 - Memorising the questions to share with others. This has been a deliberate strategy (that is sending a “test candidate” in to take the same test several times with the objective of preparing practice materials).
 - Changing the test results by hacking the system.

If testing centre security requirements were being met (as outlined in the preamble to this sub-section) and maintained, such “during” scenarios and hacking the system could not easily occur

²⁸ Red Hat Certified Engineer.

On the bright side, he says, these efforts are juvenile, infrequent, unorganised, and can be countered. Counter measures listed by **David Foster** (2003) listed include;

- Random delivery of questions (counters copying of answers by students sitting nearby).
- Random selection of test forms (test-takers are unable to anticipate which set of questions they will get).
- Adaptive testing that creates individually tailored exams (see also Donovan, 2003).
- Encryption and passwords to provide secure transmission of tests and results.
- Computerised prevention of copying and distribution of question pools and tests.

Foster (2003) says that some tests have been available for more than two years allowing earlier test-takers to share questions with later test-takers. The solution, he says, is to increase the size of the question pool, pointing out, however, that this requires increased resources and cost. Once a test is compromised, he says, confidence in that test is shaken, and the value of the certification decreased. Foster says that industry-wide efforts are being taken to combat this fraud. The Information Technology Certification Security Council (ITCSC), supported by the Association of Test Publishers and CompTIA is influential in producing guidelines and standards of testing security, developing policies, and promoting collaboration within the IT industry.

In 2005, David Foster, PhD, was President of Caveon Test Security Services, and a member of the International Test Commission.

Security efforts focus on detection and prevention, either after it has occurred or while it is occurring. This includes; authentication of test-taker, validation of test results and transmissions. Foster (2003) believes that both detection and prevention activities will be successful in reducing fraud and cheating to relatively harmless levels.

Jamie Mulkey (2004) introduces perceived value of tests and competing objectives (what is at stake for the individual with a poor test performance) as two less obvious reasons for test cheating and fraud. According to Mulkey,

tests that are developed using test standards that are poorly mapped to the training process or real-world job performance are seen as low value by both candidates and instructors. Furthermore, he says, instructors who are measured by how well they prepare students for certification exams when the exams do not map well to the instruction, who are judged by student evaluations, or are paid on the basis of how many students pass their tests may compromise the security and integrity of exams.

In 2004, Jamie Mulkey, Ed.D, was senior director for Caveon Test Security Services

Microsoft include the following information, among other information, with its policies in relation to exam security (Microsoft Learning, 2004):

- An email address is provided for submission of information regarding cheating, or selling of exam questions.
- Advice that if anyone is caught violating exam rules they will lose any Microsoft certification that individual already holds and become permanently ineligible for any Microsoft certification. Proctors at exam centres can take immediate action. Violation includes using notes taken into the test centre, copying test questions, and looking at another candidate's screen.
- There is an exam retake time period policy to ensure a waiting period between exams retakes to limit exposure to exam content and discourage memorisation of the content.
- Simulations are used where candidates perform tasks rather than answer questions to discourage memorisation of questions.

Other certification providers have similar retake, and violation policies (see Netwind Learning Center, n.d.).

In 2001, Microsoft sent a letter to its entire certified professional community and registered candidates containing the following information (Microsoft learning, 2001):

- Candidates caught cheating since June 2000 have been decertified and are permanently ineligible for any MCP exam. Since November 1999, Microsoft have closed 24 testing centres because of compromising practices.

-
- Since February 1998, based on close monitoring of suspect web sites and leads provided by MCPs, the owners of seven web sites found to be in violation of their non-disclosure agreement (NDA) by publishing test questions were decertified and are permanently ineligible for MCP exams. Since September 2000 Microsoft has decertified a dozen individuals who had posted information in violation of their NDA. Microsoft will take whatever legal action is justified and will revoke certification at its sole discretion.

Microsoft (2001) say that keeping exams as security-enhanced as possible maintains the value of their certifications and ensures only qualified IT professionals are identified as MCPs.

Process

While not directly related to the research subject, Gervasi (2000) outlines a site designed for building a knowledge base for the assembly of a random sample of questions varying according to the answers returned and for assigned scores thus gives an insight into adaptive testing techniques adopted in certification exams. Questions are grouped into two main categories; General Knowledge (GK), and Specific Knowledge (SK). The GK pool is divided into four levels of difficulty and the SK pool into six. The pool selected for each test is composed of four preliminary questions from the GK pool with a maximum score of 1.0 for each question. Depending on the score for the preliminary questions, the system will choose two different paths, selecting six questions from the SK pool having increasing levels of difficulty depending on the test-taker's score.

Peluso (2000) lists the typical five types of certification examinations:

1. Linear multiple-choice.
2. Adaptive response multiple-choice.
3. Practical measures of competency by requiring exam-takers to perform discrete tasks.
4. Simulations – tasks performed in cyberspace.
5. Essay format.

Hale (2000) argues that while passing an exam is often the main requirement for gaining certification this is not necessarily the best prerequisite for certification. "Not all certifications use tests" (p. 97), she says and agreement should be

reached among the certification programme designers on why a certain assessment item is adopted, and what the requirements and standards should be. Assessment applies to *all* of the programme requirements and goals of the programme, she says, and “rigor and validity are considerations no matter what form an assessment takes” (p. 101). Hale says there is one way to prove validity; “show that people who pass the ... [assessment criteria] can perform the task and those who don’t can’t” (p. 101). First you must prove that what is assessed is what is required to do the task, she says. Sampling error, design error, administrative error, and sources of bias must be must be controlled in assessment design.

David Foster (2005) says that creating new certification tests can be expensive (\$USD100,000 - \$USD500,000 or more) (see also Peluso, 2000). Costs areas include:

1. Content analysis: Extensive research and Subject Matter Experts (SMEs) to decide the important knowledge and skills and what should be measured. Following discussion and review determination of the assessment content.
2. Item Review: SMEs and expert editors moderation of test question drafts.
3. Field Test: Beta testing with real certification candidates, followed by analysis and re-work of the test, and determination of the final score required to pass the test.
4. Test publication: Test administering organisations typically charge \$5,000-\$10,000.

Peluso lists the following cost considerations:

- Development
- Content creation
- Administration
- Marketing
- Ongoing development

4.5 Broad category 4: Programme implementation and administration

The following themes emerged from within the broad category “Programme implementation and administration”: rigour (of the certification programme),

needs assessment, performance-based design, viability (of programme), and marketing.

Three themes emerged from within “rigour”: programme design, programme acceptance, and legal issues.

These are illustrated in Figure 14, and are outlined in the following subsections.

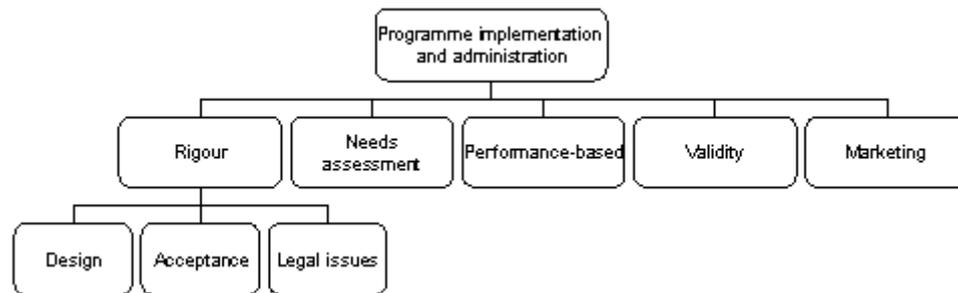


Figure 14. Themes to the lowest-level within the category “Programme implementation and administration”.

4.5.1 Rigour

Design

Certification authenticates that someone meets the established standards of the certification programme “through rigorous testing, examining, and reviewing the candidate’s knowledge, attitude, experience, and skills” (Ireland, 2003, para. 22). The means of measuring this value, he says, is a match between consumer needs, and what is offered in the certification programme. Artificial standards or unrelated requirements detract from the value of the certification as the process must have content validity. He says that the value of a certification is equal to the perception of its worth from different perspectives.

In her book *Performance-based certification: How to design a valid, defensible, cost-effective program*, Hale (2000) lists and describes in detail seven elements of a well-designed certification programme:

1. Requirements: what people must do to become certified, including continuing assessment (re-certification).
2. Standards: the assessment criteria and from where derived.
3. Assessment methods.

-
4. Assessment preparation: how the candidate meets the criteria and fulfils the requirements.
 5. Governance: policy, overseeing, stewardship, and evaluation methodologies.
 6. Administration.
 7. Public relations and communications plan.

She lists the areas of focus as; determining the need for and goals of a certification programme, defining competence, maintaining exclusivity of the credentials, measuring the impact, and ensuring the programme continues to meet the needs of all stakeholders

Peluso (2000) adds three further issues upon which a focus is required:

1. The items which make up the *eligibility criteria* which should be applied consistently and fairly to foster the perceived value of the credential. In no instance should the eligibility criteria be considered *pro forma*. For example:
 - The competence an entry-level individual must have to perform the job competently. Among the methods used to identify relevant competencies include competency-based examinations, education, experience, or a combination of these.
 - Some certifications require the candidate to submit to background checks and/or subscribe to a code of ethics.
2. Additional criteria to maintain certification should be considered to give both quality control and extra assistance to stakeholders, as well as helping the certification hold its value. This may be achieved by periodic recertification, mandatory continuing education credits, or periodic re-examination.
3. Certificate revocation should be provided for by developing professional conduct standards, and instituting a process by which complaints may be lodged against the certification holder and investigations conducted.

Hale (2000) says that “the rigor of the standards depends on the promises made by those who bestow the credential” (p. xv). The traditional approach is to design a programme based on a codified body of knowledge, but this, however, does not work for corporations, and for evolving professions in which there are no academic programmes to teach such knowledge. Corporations and professional associations develop certification programmes to counter an

absence of other relevant accreditation programmes and a lack of professional standards, she says.

Bean (as cited in Clancy, 2003) believes that the most rigorous certification (in 2003) is Cisco's CCIE, as one first needs to become a CCNA and a Cisco Certified Network Professional (CCNP), pass a written qualifying exam, and an "extremely rigorous" (para. 25) hands-on lab in an interactive environment to demonstrate expertise in testing, configuring, and troubleshooting the real equipment. It is supervised, Bean says, by Cisco employees who grade candidates on their ability to get the lab done. This, he says, is the furthest any certification sponsor has gone to assess not just knowledge, but skills and the application of that knowledge (experience).

Acceptance

Gilley (1988) points out that while some certification programmes are enthusiastically accepted in their early stages by both the practitioners and the public, others are not, and some fail. He says that programmes with poor design, shoddy implementation, or inappropriate qualification criteria have a negative impact on all professional certification programmes.

Legal issues

Rainey (2001) believes that rigour in administration is achievable by partnering with a professional testing organisation, and points out that a substantive administrative process must be legally defensible should a certified individual be charged with malpractice. Knapp and Gallery (2003) agree, saying that legal issues must be understood, and summarising the following legal risks:

- The *criteria* for obtaining a credential must be fair and reasonable.
- Individuals who are currently practising in the industry must be treated fairly.
- Antitrust issues.

(See also Hale, 2000.)

4.5.2 Needs Assessment

Knapp and Gallery (2003) outline a full membership needs assessment undertaken by the Construction Financial Management Association (CFMA) in assessing if a certification programme would overcome recent economic and ethical challenges. According to **William M. Schwarb** (as cited in Knapp & Gallery), CFMA's Executive Director, they were able to qualify and quantify their belief that a certification programme should be developed. They list criteria for assessing whether a certification programme is the best vehicle for accomplishment of an organisation's mission and goals. They say a credentialing programme is created to; provide for the health, safety, and welfare of the public; attract new members; enhance the credibility and prestige of the certifying body; elevate the status of the profession; establish standards for the profession or enhance the quality of services offered; enable identification of qualified professionals; meet the need for standards; and obtain recognition from regulatory bodies.

They list five questions for considering whether a certification programme is right:

1. Is it the best use of resources?
2. Do the benefits justify the cost?
3. Will the programme generate a positive financial return?
4. Is the timing right?
5. Is certification consistent with the organisation's mission and strategic goals?

4.5.3 Viability

Peluso (2000) says that certification programmes give the public a basis for evaluating the service provider, help employers judge the skills of potential employees, and allow certification holders to differentiate themselves from others in their profession or to advance their careers. He notes too that a certification programme can foster increased recognition of the profession as well as create additional revenue streams. Nevertheless, he warns, creating and maintaining a certification programme requires a strong plan, an evaluation of the potential for a certification programme including an assessment of existing

certifications within the industry, an understanding of the many parts of the certification process, choosing among five common types of assessment, and accounting for costs.

Knapp and Gallery (2003) say that certification is a long-term obligation, and due diligence in the planning stages will help avoid costly experiences later, that in-depth market research is needed to gauge the potential for success. One must not assume, they advise, that all eligible individuals will apply for the credential. They say not to overlook employer buy-in as this can make or break a certification programme. They quote Dale R. Cyr, Executive Director of The American Registry of Diagnostic Medical Sonographers, who asserts that the viability of a credential is directly related to the value that key groups associate with the credential, and establishing this value requires a substantial commitment on the part of the certifying body.

Knapp and Gallery (2003) also note that legal issues too must be understood, they identify major cost and resource areas, and warn that credentialing programmes should not be entered into lightly, that financial gains should not be the driving factor but rather fulfillment of an organisation's mission and strategic goals or a compelling industry need. The process, they say, should be based on sound market research, and the standards and assessment must be objective, fair, reliable, and valid.

4.5.4 Performance-based design

Ireland (2003) compares knowledge-based standard versus performance-based certification, saying that the basic difference is that knowledge is defined in a *body of knowledge* and the standard is applied using a test, whereas performance-based competency testing may include a sample of the candidate's experience. He claims that performance-based testing "gives everyone a greater degree of assurance that a certified individual will be able to perform to the given standard" (para. 27). Knowledge-based examination, he says, measures a candidates understanding of vocabulary, the body of knowledge, and some practices, whereas performance-based certification infers a candidate's ability to

perform tasks at a given level. Ireland argues that the relative value of performance-based certification is significantly greater.

According to KLi (2004), performance-based certification comprises four principles:

1. Requirements are focused on the priorities necessary to attain proficiency at an acceptable level of performance, by identifying the 20% of required concepts, knowledge, and skills that will produce 80% of the on-the-job performance.
2. Certification must be designed and implemented based on performance standards that include conditions, performance, and criteria which enables a fair judgment of a candidate's ability by defining proficiency in a measurable way.
3. The programme is based on a graduated framework of progressive certifications from a basic certification and progressing to higher levels of certification.
4. It is supported by a sustaining process that maintains performance standards, typically periodic re-testing (either re-certification or maintenance) as well as ongoing communications.

Also listed are six performance-based certification components:

1. Performance standards and requirements.
2. Training and performance support.
3. Testing, performance evaluation, and tracking.
4. A certification community.
5. Incentives and recognition.
6. Communication and ongoing reinforcement.

When these components are brought together seamlessly, KLi (2004) claim, the performance-based certification system effectively drives job performance and improved service results.

4.5.5 Marketing

Jerry Gilley (1988) says that marketing a professional certification requires identifying an exchange; the certification in exchange for a value - money, time, and commitment. The certification therefore, needs to be viewed as of equal value to the money, time, commitment and effort given to achieve it. He says

that many certification programmes fail due to poor marketing, and outlines a six point marketing plan, saying that many certification programmes fail due to poor marketing rather than bad design or intent:

1. Establish a purpose, value, and mission statement to provide a direction.
2. An external and internal environmental analysis based on strengths, weaknesses, opportunities, and constraints.
3. Set goals and objectives.
4. Identify target markets.
5. Determine the marketing mix including programme design, pricing, delivery, and promotion strategies.
6. Establish marketing strategies including market penetration, market development, diversification strategy, and product development.

In 1998 Jerry W. Gilley was a professional certification consultant and professor of human resources development with the University of Nebraska.

4.5.6 Recognition of certification holders

The following list comprises tangible examples of recognition of certification holders by certification providers.

- Credentialing recognition (Graham, 2005).
- Welcome Kit .
- Access to additional technical support (see Ohlhorst, 2005).
- Access to professional resources suites and beta evaluation software.
- Access to beta training and online training resources.
- Product discounts.
- Use of credential logos on business cards, résumés, responses to RFPs (Requests for Proposal), and other documents.
- Magazine or other like subscriptions.
- Member web site and knowledge-base.
- Regular symposia (which includes the certified community as a communication conduit from end-user back to the product manufacturer).
- Merchandise.

These represent the “value-add” benefits referred to earlier in this Chapter.

4.6 Summary

As previously stated, the vast amount of literature reviewed, and the richness of the content, from a wide variety of sources, provides in itself a level of triangulation, rigour, and robustness. While both IPA and phenomenography normally carry out themed analysis on a small sample, I believe this research makes a reasoned variance. It is my conviction that higher levels of rigour have been attained from the multiplicity of experiences contained in the material than would be the case from close interviews with a small sample. Even so, data from such interviews further triangulate the research. This is covered in the following chapter (Chapter 5).

Chapter 5: The interviews analysis

In accordance with recognised practice for both IPA and phenomenography, a small purposive sample of certification holders and employers of certified personnel was selected for the collection of empirical data through interviews. This Chapter outlines the participant selection criteria and the interview process, and presents an analysis of the data collected.

A total of five semi-structured interviews were conducted. One was electronic by email, the remainder were face-to-face. Two were conducted jointly each with two of the participants. In sum, seven people were interviewed as described in the following section. The interviews took place during May, 2006.

5.1 Selection of participants and the conducting of interviews

Certification holder participants were selected according to the following criteria:

1. They hold multiple certifications.
2. Certifications are within multiple domains.
3. They have significant experience within their domain/s.
4. They are known to the researcher.

Employer participants were selected on the basis that they employed certified personnel. Both holder and employer may also be the same person, and likewise would be known to the researcher.

Seven participants were selected according to the above.

Interviews were semi-structured allowing for the free flowing of thoughts (Appendix C is the Interview Script). This conforms to typical IPA practice where the researcher has a set of questions that are used flexibly in the interview (Smith & Osborn, 2004), and which will allow unanticipated themes to emerge (Smith, 2004). Likewise, phenomenography data collection employs explorative techniques in both general and specific ways to find the whole qualities and delimitation of themes (Entwistle, 1997). Interview questions were therefore structured to seek data regarding the value and educational

validity of industry certification that would both verify data collected in the literature review, as well as introduce new data, themes, or categories of meaning. Furthermore, interviews were conducted with the aim of reaching a mutual understanding of the theme, or themes, in focus, and were closed by enabling participants to put forward their questions and further points of view (Booth, 2001).

Testing the validity of interviewee responses followed the *four tests* method advocated by Ericsson and Simon (1993): the verbalisation describes a situation that the interviewer can directly perceive; the relevance of the response to the research task; the consistency of the response to previous verbalisation; and the perception that the response, if appropriate, is being generated from the interviewee's stored experiences in long-term or short-term memory rather than being "made up" there and then. As the backgrounds of all the interviewees was familiar to the interviewer, this latter test was relatively simple by reading the facial expressions of the respondent and mentally checking the verbalisation with what was understood about the interviewee. (The reading of facial expressions, however, could not be fully applied to the interviewee interviewed electronically.) Some questions did call for a response that the interviewee must necessarily make an immediate judgment call on, albeit based on their experience, for example the appropriateness of industry certification to SoDIS.

Responses were recorded by handwritten notes. To avoid disruption of thought and verbalisation, these were recorded during "recall" times following presentation of the next question. Positive active listening techniques (Wengraf, 2001) were used, for example "an attentive *listening posture*, a *degree of eye contact*, and *non-verbal sounds* like 'hmm' and so forth which indicate ... listening" (Wengraf, p. 128)

In order to avoid undue influence by myself as the interviewer, my own experience in industry certification was "set aside". In instances where interviewee responses were not clear in meaning, rather than clarify the meaning by drawing from my own views, the interviewee was asked to repeat the answer using different words until the meaning became clear to the

interviewer. As the interviewer, I did not discuss my own views on any given theme with the interviewees as part of the interview itself.

In addition, interviewees were provided with a copy of the write-up of the data analysis for verification.

The research criteria allowed for further selection of participants should any significant new data, and especially should any new categories of meaning emerge from the data analysis. After the seven interviews were completed, while new data had indeed emerged, no new categories of meaning had emerged. Since all but one of the participants had provided aspects of this new data, I, as the researcher, determined this to be significant enough to validate the new data. Data collection, therefore, concluded on completion of the seventh interview.

5.2 Participants' profiles

The participant profiles which follow fall into the following domains of both certification and experience:

1. ICT
2. Accounting
3. Project Management
4. Engineering (Electronics)
5. Education and training
6. Security

Dale: Software Developer and Network Engineer (self-employed). Contract Trainer. Certifications: CNI²⁹; MCDBA³⁰; MCSD³¹; MCSE; MCT³²; MCNE³³;

David: Has held a number of management level positions in a number of ICT companies, including Managing Director and owner of a Project Management, Software Development and Training (using Lotus

²⁹ Certified Novell Instructor.

³⁰ Microsoft Certified Database Administrator.

³¹ Microsoft Certified Solution Developer.

³² Microsoft Certified Trainer.

³³ Master Certified Novell Engineer.

Notes³⁴) company. David holds a BCom, is a Member of the New Zealand Computer Society (MNZCS), and has some lapsed Accounting certificates.

Gavin: Owner of a Network Engineering business. Contract Trainer. Certifications: Trade Certificate in Electronics; Advanced Trade Certificate in Radio & Television Electronics; Radio Technical Certificate; MCNE; MCNI³⁵; MCSE.

James: Full-time Trainer. Certifications: MCSE, MCSA³⁶, MCSA:Messaging; MCT, ITIL³⁷ Foundations Certificate; Pink Elephant³⁸ Certified Trainer.

Leigh: IT Manager for a nationwide company. Certifications: CNA; CNE. Also holds qualifications in Accountancy.

Neville: Independent Network Engineer, Systems Administrator contractor, and Trainer. Certifications: CNE; MCSE; MCT; SCA³⁹; SCO ACE⁴⁰.

Petteri: University Lecturer. Certifications: SANS GIAC; SAP⁴¹ System Administration.

5.3 Trustworthiness and data validation

Validity in phenomenographic research asks how well the research outcomes correspond to human experience of the phenomenon rather than how well the outcomes correspond to the phenomenon as it exists in reality (Åkerlind, 2005; Uljens, 1996). IPA of the phenomenon itself, I contend therefore as mentioned earlier, strengthens the validity of the phenomenography aspect of this research, as well as the overall research itself. Conroy (2003) uses Guba and

³⁴ "Lotus Notes" is a software product now owned by IBM.

³⁵ Master Certified Novell Instructor.

³⁶ Microsoft Certified Systems Administrator.

³⁷ IT Infrastructure Library – a certification for IT service management.

³⁸ Pink Elephant provides IT service delivery and management consultancy, training, education and IT support services including ITIL best practices (Google, 15/06/06).

³⁹ Sun Systems' Sun Certified Associate.

⁴⁰ SCO UnixWare or OpenRelease Server Advanced System Engineer.

⁴¹ SAP is a market and technology leader in business software solutions (Google, 15/06/06).

Lincoln's (1981) "four tests of rigor" (Conroy, p. 33): credibility, (truth value), applicability (fittingness), consistency, and confirmability. In keeping with these four tests, Conroy suggests the following be incorporated into Interpretive Phenomenology research:

1. **Credibility:** Participants are able to review the interpretation of their data. All participants in this research received a copy of the interview data analysis write up.
2. **Applicability:** This is confirmed by interest shown by the participants and the greater community. No prospective participant turned down the opportunity to be interviewed for this study, none requested anonymity, and all wished to see a copy of the final report. In addition, even before completion of this thesis, two papers have been accepted for publication (see Hitchcock, 2005, 2006).
3. **Consistency:** This is ensured if all interviews follow the same coherent format. As stated above, interviews, while semi-structured to allow for exploration beyond the set question format, were based on the same question set.
4. **Confirmability:** Conroy (2003) advocates neutral blind reading of narratives and interview texts. This method was not employed. I contend however, that in the presence of the first three tests, the consistency of data collected from the interview with the data collected in the extensive literature review further confirms the accuracy of the research results. Additionally, all the data, including the new data, closely corresponds to my own experiences of industry certification. This can be confirmed by an analysis of the researcher notes throughout the literature review sections and of the researcher's perceptions incorporated in Chapter 6.

Åkerlind (2005) also addresses the issue of reliability in phenomenography, pointing out that seeking like interpretations from multiple interviewees is not appropriate for phenomenography research as interpretations are made on the collective, not on an individual, basis (see also Berglund, 2005). IPA, similarly,

follows the hermeneutic principles of seeking common understanding and concurrent interpretation (Conroy, 2003). IPA seeks the convergence and divergence of themes (Smith, 2004). While this, I contend, reflects phenomenography's seeking of a collective viewpoint, IPA in contrast also places importance on *individual* viewpoints (Reynolds, 2003; McLeod, Craufurd, & Booth, 2002; Smith, 2004). I have, therefore, emphasised individual viewpoints *in addition* to a collective viewpoint.

Berglund (2005) points out, that trustworthiness becomes an issue for the reader. The researcher, Berglund says, should offer "transparency through all the processes and in the results and describe all the factors that influence his (sic) interpretations" (p. 83). Similarly, Guba (1981), Kvale (1996), and Sandberg (1997), all advocate that qualitative researchers make their interpretive steps transparent by detailing them fully, and including examples of their procedures that illustrate them (also as cited in Åkerlind, 2005). Kvale adds that to validate is to check and to question: To adopt a critical outlook; for the researcher to state explicitly their own perspectives; to question the "'what' and 'why'" (p. 243); and to constantly ask "'is this the truth'" (p. 243). The above are the validation processes I have followed as the researcher.

As phenomenographic research offers insight at a collective level, Berglund (2005) says, the researcher transcends the statements of individuals during the iterative process of forming the results. As researcher I contend this likewise applies to IPA as IPA is likewise a study of a phenomenon through actors' experiences as mentioned earlier. Furthermore, as the focus is on a collective rather than an individual viewpoint, the misinterpretation of an individual statement becomes diminished (Berglund).

5.4 Data accumulation and sorting

The categories of meaning that emerged from the literature analysis were both abandoned and adopted in interview questioning themes: abandoned in respect of questions designed to elicit new categories of meaning, and adopted in questions designed to verify or refute data gathered from the literature pertaining to relevant categories. This dual approach allowed me to mentally

slot participants' comments resulting from the former into the existing lowest-level themes as the data was gathered and accumulated. Had any data not fit comfortably into a theme this would mean the emergence of a new category of meaning. No new category of meaning emerged during this initial mental sorting process.

Not all lowest level themes from the hierarchy of meaning were covered in the interviews. No participant had the relevant experience, nor did I deem it possible, or relevant, to seek participants with such experience. The levels of expertise required for authoritative experiences within the broad category "Programme implementation and administration", for example, are relatively rare, and, I contend, is adequately covered in the literature review.

Once interviews were completed and the data collected, for purposes of consistency, the data was then sorted according to the method used for the literature review analysis. Specific statements were sorted into the themes in the hierarchy of meanings categories that emerged from the literature review. All data sorted logically into existing categories; however, new themes emerged as follows:

1. Within the theme "Benefits" (within the broad category "Market and product conceptions"), two new lowest level themes: "Two-way communication (with peers)", and "Certified community networking and communications"; and within the sub-theme "Individual"; "Reasons for obtaining certification".
2. Within the theme "Criticisms" (within the broad category "Market and product conceptions"), two new lowest-level themes: "Certification life-span", and "Ignores recognition of prior learning and practical experience".
3. The broad category "Recognition" a new lowest-level theme was added: "Comparison to academic qualifications".

5.5 Data analysis

The data analysis that follows, therefore, is based on these, and the existing lowest level themes that emerged from the literature review as illustrated in Figure 4, page 40.

5.5.1 Certification benefits

Reasons for obtaining certification

While all six certification holders cited different initial reasons for obtaining their certifications, all six expressed the belief that obtaining the certifications had been beneficial to, indeed necessary for, their desired career path.

Reasons for obtaining certification were both individual-based reasons - a personal choice for certification as a medium for career advancement, and employment-based reasons - the certification was required for their job. In two instances the certification was mandatory before being able to work on a particular job.

Gavin: 20 years ago I achieved an Advanced Trade Certificate. I had an interest in electronics, and that was advancing rapidly. Certification was an easy next step. After the first level you realise what you don't know. Certification gives you that foundation knowledge.

Leigh: It is natural to do it. It is required to get you into the role you want. It is the natural progression to the next career step.

Dale stated that to get reseller status he needed the certification - a quality requirement mandated by the product vendor.

All six certification holders said that the desired outcomes in obtaining their initial certification/s had been achieved. All had progressed to further certification/s

Career progression, peer recognition, two-way communication, and promotion of skills.

All six certification holders mentioned continued career progression as a benefit of a certification. Additionally, peer recognition, and providing two-way communication channels with peers, was also mentioned by all certification holders as a major benefit of having a certification:

Gavin: [Between peers] there is two-way communication; information flows two ways.

Dale: It is easier to communicate with peers as it aids with recognition and one's base credentials (but it doesn't mean you know everything!).

Peer recognition is especially the case for the female interviewee:

Leigh: As a woman you get a lot more credibility. [Technicians] are more willing to share a lot more information than they normally would.

Certification allows you to assess the minimum levels of knowledge of your peers, as it establishes a base level of knowledge (Dale; James; Neville) and skill (Petteri), and a benchmark measure of competency (Leigh). Certification can also be used to promote and hone one's own skills:

Neville: As a certified trainer you can get a specialised listing with some training providers. Additionally, you can also get a feel for what the expectations of the [certification sponsor] vendors are, plus you get the benefit of the associated training.

All interviewees concurred that certification is a superficial benchmarking device allowing people to "see where you fit" and is an introduction and confidence device - "until you open your mouth" (Gavin). It does not *prove* competence (Dale; James). Nothing, Gavin says, beats a quantifiable personal reference.

Petteri says that certification has, for him, proven beneficial for further employment. James says he likes the challenge of attaining certification. Dale and Neville concur that certification is useful, and that the qualifications are needed. Gavin says to work at a level where you are responsible for outcomes and peers in IT one *must* be qualified.

From an employer's point of view

All three employers, as well as the remaining certification holders, concurred that a certification can help in profiling a person's level of expertise. However that is all a certification does, it does not prove competency, but is an indicator of competency (Dale; James).

Gavin: It gives the ability to gauge strengths and weaknesses between people. You can see a person's perceived career path. You can see how you

can develop people long-term. You can use [certification] as a carrot to poach staff.

Neville: It forces companies to keep their technicians up to date. They are able to assess the ability to train someone in a given product.

Leigh says that you can see what people are striving for; where people need upskilling.

As a regular employer of staff, David says he placed a lot of emphasis on a certification as it provides something tangible about the person's skills. But this is as far as it goes, David says. Once you have the certified people;

there is little emphasis on the job as the emphasis is on **demonstrated** skills and experience. The only real benefit is demonstrating to internal and external parties that you have staff with a recognised level of skill. [The customer gets] a level of comfort that they are dealing with people with a recognised level of skill.

Leigh believes that the major benefits of certification are the employee's; the employer receives only some of the benefits.

Other certification benefits

Once interview participants had completed free expression of their perceived and experienced benefits, the interviewer then presented for open comment those benefits from the literature review that had not been mentioned by the interviewee.

Career progression, job diversification, and remuneration

Dale and Leigh concur that certification opens doors. Neville says that some certifications are recognised by some companies as a tool for career progression. Petteri says that some certifications help for job diversification and remuneration in some situations. All interviewees said that while there is a correlation, it is also based on on-the-job skills and *natural* career progression.

Gavin adds:

Non-technical employers in New Zealand tend to use any preceding courseware as a one-stop fix and users tend to be thrown in the deep end. The employer has expectations beyond their first level of training. It can be beneficial or detrimental to the technical progression of that person and they need to understand the comprehensive nature of completing the complete certification process.

“Value-add” benefits

All certification holders concurred that the major “value-add” benefit is the ability to enter into dialogue, especially for escalation, with peers and support networks. Access to knowledge bases and support tools was cited by some as a benefit, but not all interviewees concurred:

James: Much of the benefit comes in the form of things like community forums, networking opportunities, and opportunities to attend key industry events and major conferences, including manning booths in exchange for free admission. There is now recognition by other vendors in the value of these communities, and we are seeing more vendors offer free or reduced priced software, books, and/or hardware to members of certain [other] communities.

Some of the knowledge bases and support [however] have undergone drastic overhauls in regards to the vendors approach ... both in extending access ... as well as turning them into profit centres. As a result what was once a benefit is now more commonly available to the masses.

Leigh says that, often, New Zealand is too remote to take full advantage of such benefits.

Other “value-add” benefits, such as magazines and free software, were not seen by the interviewees as significant or important:

James: Over the years ... at least in the IT industry, the benefits that can be directly related to cash value tend to have dropped. [There’s] not as much free stuff from the certifier.

5.5.2 Criticisms (certification “dislikes”)

To elicit criticisms of industry certification, participants were asked to discuss their dislikes of certification. Generally, these criticisms corroborated those emerging from the literature review. One further lowest-level theme, however, emerged: “certification life-span”. The lowest-level theme, “Too easy (to attain), was expanded to include “ignores recognition of prior learning and practical experience”. The revised sub-themes within “Criticisms” are illustrated in Figure 15.

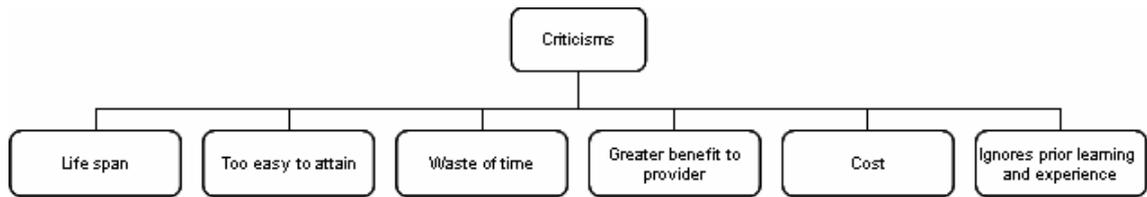


Figure 15: New hierarchy of categories of meaning within "Criticisms".

General criticisms

Too often, David points out, the certification *ignores prior learning and practical experience*. This notion was generally corroborated or inferred by the other participants.

Dale says that some certification providers, in particular Microsoft, pushes the certification itself rather than the benefits gained from it. Petteri adds that some providers appear to regard certification as a “cash-cow thing” which sometimes seems to override reason. Leigh says that some certifications can be too generic and become devalued as it can be used as a quick means to an end. She referred to the general use of the term “paper MCSEs”. While he says that there is nothing wrong with having the letters behind their name, Dale worries that some may “hide behind the badge rather than the real person coming to the fore”.

Neville adds that some vendors do not take certification as seriously as they should, and will change the benchmarks according to market demand causing the certification to depreciate too quickly. Petteri concurs that some certifications have, understandably, a short life span, for example the SANS GIAC certification. The maintenance programme, however, for keeping your certification current is not very professional. He says that it becomes more practical to maintain your skills by experiential work in the field rather than by constantly re-sitting exams. Neville concurs that some certifications lack an upgrade path, and that upgrade recommendations tend to be vendor-directed rather than need-directed.

The above is perhaps best summed up by James:

Too often the industry misuses the certification, taking them to indicate things for which they were not designed (like experience levels), or ... [ties them] directly into salary packages ignoring the fact that knowledge does

not necessarily equal competence. This has a tendency to, over time, devalue the certifications in the eyes of the uninformed/unaware.

Other criticisms

As with certification benefits, once interview participants had completed free expression of their perceived and experienced criticisms, the interviewer then presented for open comment those criticisms from the literature review that had not been mentioned by the interviewee. While some criticisms within this interview question were mentioned by some interviewees within the previous interview question, others did not and are therefore reported here.

“Cost”

While Dale says that the direct cost is not a criticism, the actual cost of keeping some certifications does not have an associated income return. Leigh says that the cost of getting all employees certified is a significant factor. Gavin points to the sometimes huge regional variances in cost, quality, course content, and delivery of the associated training, with some costs perceived as unjustified, as well as vendor bias within training programmes. Neville says that the cost is a measure of the seriousness of a given certification.

“Too easy to attain”

All but one of the certification holders felt that *some* certifications are too easy to attain. Gavin added that such certifications do not have enough “real-life skills”. “They become a mouse-genius – all they know is what they see”, he says. Petteri, on the other hand, sees this as not necessarily a criticism but that such certifications are at different (lower) levels, and reputation.

James says that while some certifications are extremely rigorous, some are indeed too easy to attain. He describes certifications that rely solely on passing standardised exams as having “lost their value”. These certifications, he says, demonstrate knowledge, not competence or as being a reflection of experience.

“Certification is a ‘waste of time’ if one already has the experience”

None of the certification holders agree with this criticism. Dale says that while getting a certification if one already has the depth of experience may not be *necessary*, one gets valuable knowledge if they do. Getting the exam *proves* their knowledge. Neville says that many technicians think they are experts when they are not, that certification forces them to keep up to date with their knowledge. Petteri agrees, saying that certification is not a waste of time if you already have the experience on three counts: It is faster to get; for the other benefits; and is a handy way of proving you have the skill. Leigh also agrees, adding that getting the certification corrects bad on-the-job learning; that “everyone gets a better understanding of what the person is meant to know”.

Gavin sums it up this way:

Certification gives refinement to the knowledge. It gives focus to defined roles and rules. It stops ‘ad-hoc-ness’, ‘band-aid’ fixes, and ‘loose cannons’. It gives confidence for disaster recovery, and teaches you to document, document, document.

Petteri adds that “paper” certifications are still worth something; a place to start. It helps in the job market where you may be competing with people without either the experience or the certification, he says.

Citing from real life James illustrates a cost-benefit trade off:

I was having a discussion within someone ... about whether or not getting an MCSE would be beneficial for him as he has approximately five years experience and is contemplating ... [moving to] the U.K. It came down to business value for himself – if he could attain [certification] in a cost-effective way then it might make sense in that it would at least get him a look [in] when pursuing work in another country. However, given his experience levels, it probably wouldn’t be ... worth spending \$10,000 on [certification], but if he could do it for ... [much] less it probably would be ... [beneficial].

“Of greater benefit to the certification provider”

All certification holders except one believe that this criticism is somewhat true, however it is offset by corresponding benefits to the certification holder (as outlined in this analysis). Dale believes that while the certification provider benefits, those benefits are directed accordingly into product support, and

reinvestment in the channel⁴². Neville says that while channel support can be good, some certification providers do not provide adequate support.

Leigh says that the certification provider realising the greater benefit is only true once the certification becomes devalued and too easy to attain (as discussed above). She adds that it is in the interests of the provider to set and maintain the standards. Gavin says that certification should be based in ability, not numbers, that the objective should be investment in the future. James sums this up:

I think the truth of it lies in the fact that the vendor now has a small army of knowledgeable, sympathetic people out in the market. One would imagine that this would result in increased sales of their products/services. And, hopefully, better installations ... which [further] results in better impressions of the vendor in the ... [end consumer].

5.5.3 Performance-based and vendor-neutral

The themes “Vendor-neutral” and “Performance-based” are the lowest-level themes within the “Acceptance” theme within the broad category “Market and product perceptions”. This hierarchy, along with the themes within it, did not change following the interviews. The views and perceptions of the interviewees pertaining to these two lowest-level themes follows.

The significance of “Vendor-neutral” certifications

The views of the interviewees varied widely from the belief that all certifications should be vendor-neutral if at all possible, to the belief that it does not matter. Dale points out that while Microsoft’s MCSE is very vendor specific, that is what it is for. Leigh broadens this notion by pointing out that with vendor-neutrality, the knowledge is applicable to a wider range of situations, however, this may not be specific enough for a given situation, for example a Novell network. She describes this as “situation specific”. Petteri adds:

Vendor-specific would [have more value] ... in an environment dominated with the vendor specific [product]... If that vendor dominated the market then this becomes a significant advantage. Vendor-neutrality ... [has] a significance similar to academic courses – proof of general capability within

⁴² Refers to the certified community “channel”.

the subject area. [While] this may be a benefit ... for academic positions, ... [it may be] a hindrance when applying for corporate roles.

This, he says, is because in the corporate environment one is often required to perform a product-specific technical role. He adds further:

Academia has traditionally belittled the vendor-specific certifications for elitist reasons or for simply not having an understanding, or interest, of vendor-specific certification content.

Neville presents a discussion on vendor-neutrality versus vendor-specific: The benefits of vendor-neutral certifications, he says, include:

1. Vendors are on a level playing field.
2. Certified staff have a greater choice of employer; employers have a greater choice of certified staff.
3. Vendor monopolies are avoided.
4. Certifications are more transferable.
5. If nationally based it may be recognised outside national boundaries.

On the other hand he presents the following considerations:

1. Methodologies need to be in place to ensure certification is market driven (rather than vendor driven).
2. It is unclear who defines, maintains, and measures the standards.
3. Who funds the costs? The certified community may need to fund it.
4. Vendors may end up prohibited from providing product-specific certification.
5. There may be a lack of sponsors. No one vendor has a clear advantage hence all vendors may remain silent.

The benefits of vendor-specific certifications, Neville says, include:

1. Potential for timely and "leading edge" technology-specific certification.
2. More timely release of training materials.
3. No or low up-front costs to the community.
4. Staff and employers can target certification to vendor and market demand.
5. Vendor can be flexible about certification requirements upon entry of a new technology into the market.

He further poses the following considerations:

1. Certification is market-driven by virtue of the vendor's participation.

2. Trainees may be required to learn vendor-specific tools to the exclusion of others and not be made aware of alternatives.
3. Certification standards may be manipulated by region and time according to vendor needs.
4. Vendor may drop the certification without notice.
5. Vendor may flood the market by making certification easier to promote their own products.

James sums up this issue this way:

Some vendor-neutral certifications have a real high and perceived value (ITIL for example), whereas others have not captured that same reputation. And, there does not seem to be an obvious correlation between the provider and the certifications.

James presents this example: CompTIA is the provider of A+, Network+, and Security+ certifications. While, he says, A+ is perceived to have worth; the other two do not seem to have the same reputation. James has the suspicion that vendor-neutral certifications actually correlate to the “luck of matching current pain points in a respective industry”:

As IT departments mature, and business attitudes towards IT mature, there is a natural pressure for better functioning, more strategically aligned with IT departments. This is often expressed by providing ‘services rather than systems’. The ITIL framework for IT service management seems to dovetail well with the current trends ..., and ... this certification seems to be growing in perceived worth. Security is still regarded as ... a specialist area, and as a result the Security+ certification does not have as high a perceived value to organizations.

The significance of “Performance-based” certifications

David’s view reflects many views in the literature when he says that to add a performance measure would increase the value of the certification. Leigh, on the other hand, does not believe that a performance-based certification has a huge significance, as one often finds that someone hiring on the basis of a certification “has no real appreciation of what needs to be achieved to actually gain that certification anyway”. She does, however, add:

I would agree that some performance-based assessment would have an added value to the worth of the certification in some circumstances, and may in fact intangibly add value to the candidate themselves by giving them practical experience.

But, she adds further, that in the real-world hiring situation she is not sure it has a huge amount of applicability. Petteri, on the other hand, believes that

performance-based certification will guarantee that the person can actually perform the job rather than just remember things they read about.

But Dale does not believe that there are any true performance-based certifications, and that they would be very expensive. James' view differs:

Some vendors are taking steps to increase the value of their certifications adding new, higher-level certifications that are a combination of exams and practical knowledge, demonstrated in varying ways. ... Microsoft has introduced an 'Architect' certification that involves holding an existing [Microsoft multi-exam] ... certification, minimum time spent in industry, and then undergoing a year-long board review process of your credentials/skills (as demonstrated by various submissions to the board).

James also mentions Cisco and Red Hat as also providing some higher-level certifications that have some kind of performance-based criteria. The industry, he says, has generally applauded these moves. He suspects that more major vendor certifiers will follow this trend.

Neville believes that performance-based assessment can "weed out book-worms", and can be designed to reflect actual job performance. He points out that performance-based assessment is more complex and therefore more costly, requires more experienced examiners, is subject to the requirement of additional resources, and has a longer lead time for new technologies. He adds that performance-based assessment may not, however, reflect and evolve with actual job requirements.

James further adds:

Many certifications are strictly exam-based, and while examining bodies actively take steps to reduce cheating and eliminate memorization of questions in the [question] pool, there is a growing opinion that certifications that are solely exam-based are too easy to 'cram' or 'brain-dump' through. ... As such [they] are not a reflection of ability, maybe not even [of] knowledge, but of one's ability to pass a multi-choice exam!

While Dale believes that vendors will be pushed to performance-based testing by media pressure rather than by customer demands, he sums up this way:

However, any test that requires you to 'think' and ... 'do' is always ... far better than multi-choice text book regurgitation. Does it matter to the guy taking the exam? Yes. Does it matter to the employer? Yes - if they are ... educated in the difference.

5.6 Comparison to academic qualifications

The sample was asked how they considered an industry certification fits with an academic qualification. All of the interviewees considered both industry certification and academic qualifications to be of importance, but in differing ways.

James says that his IT certifications gave him credibility in IT fields where his academic qualifications had little benefit as they were not related to those fields. However, he points out, his academic qualifications are quite unrelated to his certifications. He adds that as he moves toward more management-level positions, his academic qualifications become more relevant.

Both certifications and academic qualifications are needed for the industry; they are complementary (Dale; Leigh). A university qualification, Dale says, is not product specific, but the certification “opens [the product specific] doors”. Leigh adds that one can have the certification without the degree, but not the degree without the certification. David concurs, saying that a university qualification is more academic, presenting varying opinions on a topic and encouraging examination of a topic from varying viewpoints. A certification, he says, is more technical, showing what must be done to achieve a specific outcome.

Neville says that a university qualification is much more comprehensive, deeper, and more thorough. It helps with the vendor-neutral issue, he adds. But, he says, a certification is quicker. Leigh agrees, adding that universities are not keeping up with market demand for IT professionals as it takes too long to fulfill an immediate demand with an undergraduate degree. Petteri sees that each has a different market. He believes that some, especially in the high technical skill level space, may possibly be advantaged with three years of technical certifications rather than with a degree. He sees that some high-level technical certifications could integrate well with specialist degree majors. He adds:

The more you have to show for yourself the better off you are. Employers have a particular need at a particular time, so having both [a certification and a university qualification] allows them a better choice.

Gavin says that a university qualification can be too science-oriented whereas a certification is generally customer-oriented. The university qualification, he says, generally, does not give real-world experience, whereas the certification is more task- and career-specific. He adds that this is not really the case with AUT University qualifications, as AUT are more market, real-world oriented. Gavin believes that just as academic qualifications are, industry certifications should be part of the Government's overall education strategy.

Petteri provides some anecdotal evidence:

A sample of 15 industry professionals said that if they were faced with two [job] candidates at entry-level where skill was the key, and given they had no other information to go on, they would take the certification over an undergraduate degree.

5.7 Maintaining and extending certifications

In order to further examine the value to the sample of their certification without aligning with any previously established or emergent theme, the question was asked of the certification holders if they planned to keep their certifications current, and/or pursue further certifications.

The responses were varied, ranging from a straight "Yes" to "No". One certification holder stated that he had maintained his core Microsoft certifications for over 10 years and had just recently renewed them. Additionally, he had plans to add additional certifications in the next 12 to 18 months. The reasons posed for not planning to renew was the rapidly changing nature of the current IT industry with "vendors going in all directions". Once a direction and standards are established, he adds, he will reconsider. The three remaining interviewees also answered in the negative, adding that if they changed their field, (within IT), or if it were required for the specific job, they would pursue the relevant certifications.

5.8 Summary

This interview analysis data here presents both collective and individual viewpoints that reflect, enhance, and extend the data from the literature review. As stated earlier, new data was collected within existing themes, new themes

emerged, and theme descriptions were expanded to cover new data. No new broad categories emerged.

Interviewees were also asked for their viewpoint on the relevance of an industry certification as a credential for analysts and teachers of SoDIS. The resulting data is detailed in the final chapter: Chapter 7, "Implications and Recommendations". Also included in chapter 7 is a review of existing risk analysis certifications and the implications for SoDIS.

Chapter 6: Discussion, researcher perceptions, and conclusions

This chapter presents the findings from the research as a broad discussion that draws from three sources of data: the literature analysis, the analysis of interviews, and the researcher's own experience and perceptions. The discussion is divided into sections that represent all the main themes within the hierarchy of categories found in the analyses. Conclusions within these themes are presented.

Figure 16 (following page) illustrates the conclusive hierarchy of categories of meaning combining both the literature review analysis and the interview analysis. The shaded boxes represent the lowest level *selective* themes within the main themes as mentioned above. As has been previously explained, these are the themes that were selected for more detailed analysis, with subsequent discussion in this chapter. Where there are parent themes above the shaded box, the discussion will appear under a sub-heading matching the parent theme. Italics are used for lowest level themes below the parent when mentioned for the first time unless it is a sub heading. Discussion is delineated by parent theme, as are the conclusions drawn from the discussions. The conclusions, therefore, are included in this chapter.

Chapter 7 presents implications and recommendations drawn from the conclusions in this chapter.

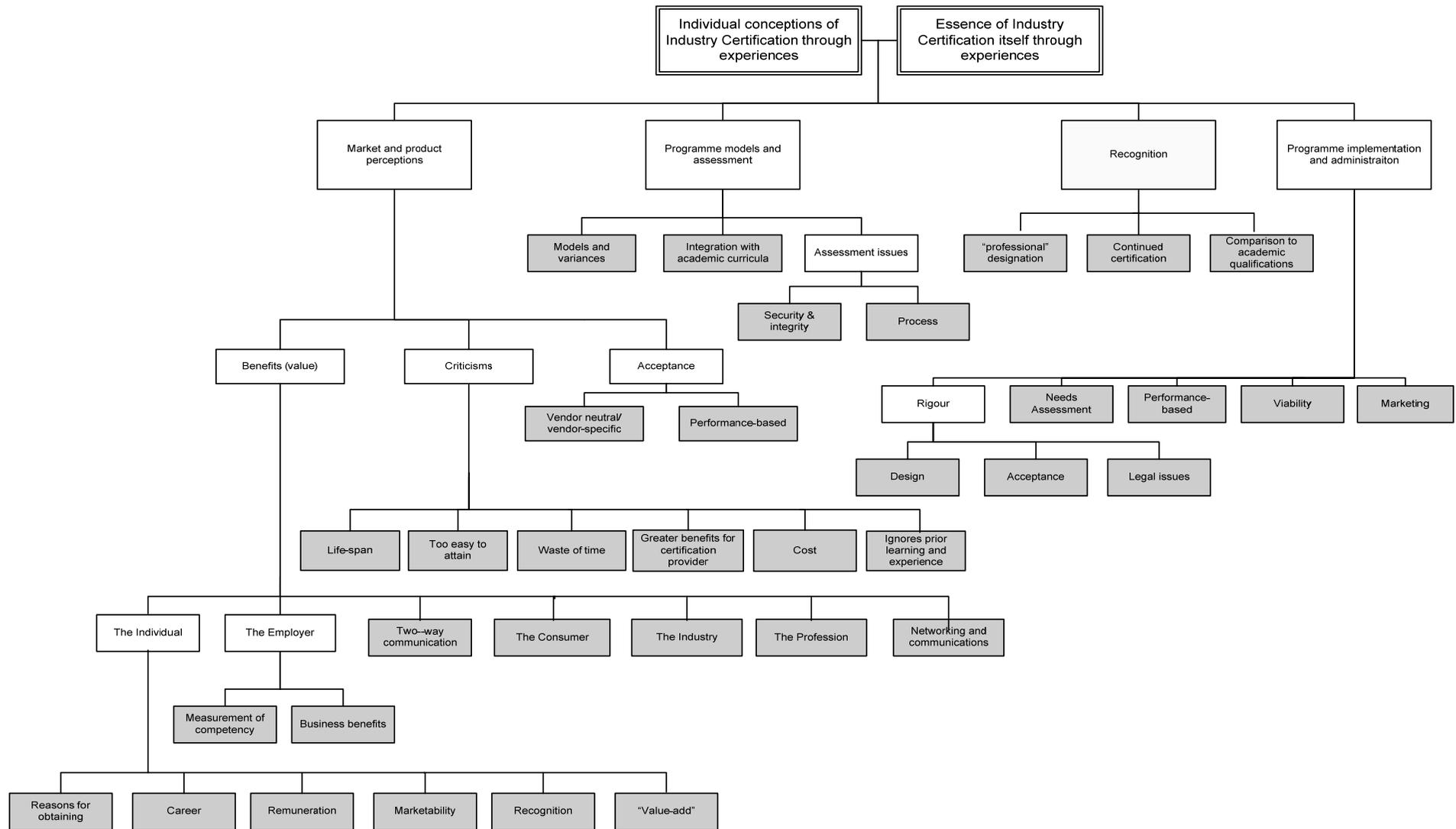


Figure 16: Conclusive hierarchy of categories

6.1 Certification benefits

6.1.1 Benefits for the individual (Parent theme)

Reasons for obtaining certification

While the reasons for obtaining certification may vary, there can be little doubt that certification helped John Gow, Pierre Folkes (see Chapter 1, section nine), and all of the certification holders interviewed into their desired positions in their career. Certification established their base level of knowledge within the domain of their certification, they became accepted as knowledgeable professionals by their peers, and they became more marketable as professionals within that domain.

Variances in reasons for obtaining certification include;

1. To advance one's career and open new career opportunities.
2. Validation of the experience the candidate already has.
3. A requirement of becoming a reseller or trainer for the given product or service vendor.
4. To advance and prove one's knowledge in a given domain.
5. To be able to move from one domain to another, or to embrace a totally different career.
6. To acquire new knowledge when technology advances within a given domain.

All of the interview subjects agreed that, in their particular case, such objectives were realised.

Once realised, considerable further benefits to the individual accrue. A certification holder's base level of knowledge is established giving them *more marketability* to prospective new employers and to the consumers of the product or service within the domain of the certification. While, as emphasised many times in the literature, and reiterated by the interview subjects, this base level of knowledge does not equal competence or proof of experience, it does, however, allow the certification holder to "get their foot in the door" (Gorley, as cited in Alexander, 1998b, para. 17). Some certifications, however, do contain a performance element as will be discussed later in this chapter.

Career advancement and increased remuneration

The most significant reason for obtaining certification is career advancement. Childers (2001) argues that performance-based certifications carry a higher value than do other (non-performance-based) certifications, with the holder receiving higher levels of confidence, recognition of competence, prestige and enhanced career advancement opportunities. While Childers' bias is his own company's performance-based certification, his comments, in my view, are valid and impartial. The literature regularly mentions performance elements as adding value and credibility to a certification as well as to a certification holder's credibility.

While increased remuneration was often cited as a benefit of certification in the literature, the interview sample put this into context: In their view, increased remuneration is a result of natural career progression and advancement, albeit resulting from the knowledge and subsequent skills accruing from the certification, rather than as a result of attaining the certification itself. The interview subjects concur that a knowledge-based certification does not prove competence, that only experience, and proof of that experience, proves competence. My own experience bears this out, as many certifications are criticised as being "paper" certifications, that is they do not measure *performance*, and which an inexperienced certification candidate could easily attain. Even "paper certifications", however, as John Gow would attest to, still carry the significant benefits discussed here for the certification holder given that their on-the-job skill levels rise to match their newly acquired knowledge.

A recent report confirms these arguments. In the US and Canada, 51 per cent of respondents to a recent Foote Partners survey of 54,000 IT professionals were receiving some form of additional pay for individual certification and skills (Tekrati, 2006). On the face of it this tends to contradict the interview subjects' view, however, the survey also finds that the growth rate of non-certified IT skills was *higher* than that of certified skills. This illustrates the continuing trend towards recognition of *practical experience* rather than just knowledge. It must be noted here that the interview subjects' view is from a *New Zealand* perspective. This issue remains open to debate and further research. I contend,

however, that the data gathered in this research clearly indicates the propensity for career advancement and increased remuneration, generally, for those who attain industry certification.

Peer recognition; two-way communication

Another significant individual benefit is peer recognition. Au (as cited in "On the right track", 1999) says that certification provides worldwide recognition of expertise in a given field; AAPNZ (2002) claims that a certification holder is recognised as a professional at the work they do and will be valued by others. This was poignantly corroborated by Leigh when she pointed out that as a woman she gets much more recognition as an expert in the field of her certification and willingness to share information in two-way communication with peer technicians than she did prior to her gaining a technical certification.

Novell (as one example) have established this two-way communication channel at the highest level. Novell maintains an extensive certified professional community discussion base and holds regular symposia. Feedback from their certified community helps build, improve and develop their training and certification programmes, as well as being a communication link between consumers and Novell (G. Houston, personal communication, May 13, 2005; see also Novell Brainshare, 2005).

"Value-add" benefits; certified community networking and communication

"Value-add" elements are also regarded as benefits to the individual of a certification. Such benefits include access to technical data, access to additional technical support and escalation processes, access to beta software; access to beta training and other online resources; product discounts; use of credential logos; subscriptions; regular symposia and/or other forums and peer communities. While these were mentioned, albeit sparsely, in much of the literature, the more substantive data came from the interview subjects. The significance of these "value-add" benefits ranged from high value to insignificant.

Of high value are community forums and networking opportunities where knowledge can be shared with peers and the vendor or certification sponsor (James). Of low-to-insignificant value are magazine subscriptions and free software. This, however, is not due to the individual element value, but to the availability of these value-adds from the certification vendor or sponsor. As James points out, benefits directly related to a cash value tend to have been reduced with not as much “free stuff from the certification supplier”. These comments tend to imply that while such benefits have been reduced, the demand for the given certification still remains strong, that getting “free stuff” is not a motivational factor in seeking a certification but rather a subsequent, but not so important, benefit.

6.1.2 Benefits for employers (Parent theme)

While many certification candidates pursue certification on their own initiative, a number are directed to do so by their employer. In these cases, while the individual may or may not see the benefit, their employer certainly can. These benefits may be seen as long-term, that is an employee with the required base level of knowledge who will make a valuable contribution to the work force, or as short-term; it is a requirement of a specific contract that the employer may be in the process of securing.

Employers must be mindful, however, not to rely overmuch on the certification as a *measurement of competency*. As James and Dale point out, a certification demonstrates knowledge, not competency (see also Knapp & Gallery, 2003). It does, however, give an employer the ability to assess a base level of knowledge, and strengths and weaknesses between people (Gavin). Certification is also used by employers to keep their workforce technical skills current, and to train their staff in new technologies (Leigh; Neville).

As an employer, David used certification as tangible evidence of a candidate’s skills, however once on the job this paper-based evidence needed to become *demonstrated* skills.

It is within the theme measurement of competency that the only substantive research was found apart from Adelman’s (2000) quantitative research on IT

certification metrics. Cegielski (2004) found that the majority of HR professionals believed that certified administrators were on average more competent, yet only four (of 27) IT professionals believed that certification correlated to ability. Cegielski emphasises that industry certification is *one* criterion for assessing job candidates.

In another study, Cegielski et al. (2003) found that while many employers assume that certified network professionals are better able to manage network resources, end-users of those networks did not have higher perceptions of certified network administrators than they did of non-certified administrators. This appears to support David's point that on the job it is *demonstrated* performance that matters not the certification in itself. Cegielski (2004) concludes that "certification is not a robust predictor of ability" (p. 105), which concurs with other literature, and the data from the interview subjects. He does, however, point out that certification is one of the most common tools for the measurement of job candidates, and that many employers do place a great emphasis on external credentials during the candidate selection process.

These "external credentials" include both industry certifications and academic qualifications. Au (as cited in "On the right track", 1999) argues that these are complementary; Leigh's view is that a certification carries the greater influence; Petteri provides anecdotal evidence that supports this view.

While the degree of emphasis placed on certification as a measurement of ability is the subject of much debate, Bean (as cited in Martinez, 2005) provides some tangible *business benefits* for employers: a decrease in employee turnover; an improvement in client retention; an increase in productivity; faster promotion for employees; and reduced hiring costs. Other writers concur: Robertson (2003) adds increased customer service and subsequent satisfaction levels; attaining marketing leverage; and a meaningful way to invest in staff. Starnes (2004) says that having certified staff also reduces risk and exposure to third parties.

My experience concurs with Bean's (as cited in Martinez, 2005) arguments except for one point. Inforplex was a subsidiary of the Trilogy Group. Trilogy had a policy of certifying their technical support staff, for all the reasons

discussed above. The point that did not prove true, however, was staff retention, as it was found that staff with certifications were *more likely* to seek new employment than those without certifications. This, however, was not a deterrent as the overall benefits to the company were greater than the threat posed by some technicians leaving. Leigh makes the point, however, that the major benefit of certification is derived by the individual.

6.1.3 Downstream benefits

The benefits of certification to the individual and employer company discussed above obviously have downstream *benefits for the consumer or end-users* of the product or service within the domain of the certification. As an individual's levels of knowledge and competency increase, so too does the level of service to their end-user. This results in increased satisfaction levels. It follows that consumers will then demand that certified professionals provide their service. This logic is supported by Ireland (2003) who argues that consumers expect their products and services be delivered in a consistent and professional manner. Dilley (as cited in "Informatica", 2001) further argues that certified individuals help customers derive the maximum value from their investment. Lightle (as cited in Bowman, 2002) says that buyers are requesting certified product and service providers to assure they will be working with knowledgeable professionals, and Ohlhurst (2005) argues that certified technicians provide faster deployment with fewer problems. Gavin argues that certification refines the holder's knowledge, gives focus to defined roles and rules, stops "ad-hoc-ness", gives confidence, and teaches the technician to document their processes for future reference. All these are significant benefits for the consumer of the product or service.

Additionally, *benefits to the industry or professional community* within the domain of the certification accrue. As customer satisfaction levels increase, overall confidence in the product or service increases. In the case of a product, this benefits the vendor significantly. In the case of a profession, the profession itself significantly benefits: Practitioner knowledge and competency levels are raised, as is the overall confidence in the professional community and their services.

6.1.4 Conclusions

Industry certification accrues many benefits; for the individual certification holder; for their employer; for the consumer of the product or service within the domain of the certification; and the industry itself or profession that the certification domain falls within. Regardless of an individual's reasons for obtaining certification, these benefits will still accrue.

These benefits significantly add to the value to stakeholders of a certification within the specific domain of the certification. Some certifications accord a higher value than others, namely those with a practical or experiential content. Certification providers can therefore significantly increase the value of their certification by ensuring a practical or experiential content.

Value is added further by elements of peer and certification provider communication forums and knowledge bases, with the outcome of adding new or enhanced knowledge and competencies to the overall knowledge levels of certification holders. Additionally, communication channels between the end-users and the product or service vendor can be facilitated and enhanced by certification holders and their professional practices, including the use of forums such as Novell's "Brainshare". Such elements are able to be set up and supported by certification providers.

As discussed above, employers must be mindful to not place too much emphasis on a certification alone, that it is *one* of a number of criteria for assessing job candidates.

6.2 Criticisms of industry certification

6.2.1 "Paper" certifications

While many praise industry certification and its benefits, there are some who vilify it. One of the early criticisms to surface was so called "paper" certifications, that is certifications that show the holder has the knowledge, *on paper*, but does not necessarily have any experience in the domain to support that knowledge.

In my view this criticism is flawed. An individual gains experience by working in the field, working on real tasks. How, then, does anyone qualify to work on a task to gain the experience in the first instance? Is it not by gaining a qualification that indicates competent knowledge, attitude, and some skill in that task? I argue that it is, and further argue that this, then, invalidates the criticism, and a so called “paper” certification becomes a valid qualification, just as a University qualification is for the new graduate - a valid qualification needed to work on a given task and achieve the next level of credential; experience.

This argument is supported by Petteri who points out that certifications are a place to start, that it helps those in the job market who may be competing with others who have neither the experience *nor* the certification. John Gow certainly proved this argument, as have many others.

6.2.2 Some certifications are too easy to attain

A second criticism is that some certifications are too easy to attain, that they are “given away” to anyone who takes them (Semeraro, as cited in Alexander, 1998b, para. 21). As mentioned in the preceding chapter, all but one of the interview subjects agreed with this with regard to *some* certifications. Some, they felt however, were extremely difficult to attain and subsequently were considered of a higher level of value. This is supported by Marlek (as cited in Alexander, 1998b) who says that many exams are difficult and intensive. My experiences of many certification vendor provided classes and the failure rates of first time exam takers supports this argument.

6.2.3 Certification is a “waste of time” if one has the experience

A third criticism that emerges is that a certification has no value and is a “waste of time” once an individual does gain experience. One could argue that there are many cases where an individual’s so called “experience” has been incompetently delivered as the knowledge is lacking, or the individual has learned bad practices. How then does an individual prove quality and competency of experience? I contend that a certification validates knowledge and competency in practice, thereby validating the experiential content of the

individual's credentials. Thurman (2001) came to believe this, as do many employers. Similarly, Folkes (as cited in Venator, 2005) used certification both to enter the IT sector and gain experience, then validated and grew the experiential content of his credentials using certification.

This argument is summed up by Ash (as cited in Alexander, 1998a), who did not need to attain certification but did so, as he had decided they were "good insurance" (para. 17), especially if he were to switch jobs. "I think it is a verification of your knowledge" Ash says, "It would have been stupid not to" (para. 18).

In my experience, many comments such as "certification is a waste of time" came, in the main, from individuals with no ambitions for career advancement, and who did not see a danger in being left behind by advancing technologies. In many instances, nevertheless, these employees were directed by their employer to complete a certification as the employer could see the benefits as discussed above.

Furthermore, none of the certification holders interviewed agreed with this criticism. As they pointed out, attaining a certification gives refined knowledge to their existing experience, it *proves* their knowledge, it ensures their knowledge is kept up to date, and it corrects bad on-the-job learning.

6.2.4 Certification is of greater benefit to the certification provider

A further criticism is that certification is of greater benefit to the certification provider. As outlined in Chapter 4, a contributor to Foster's (1997a, 1997b) "Gripe Vine" says that there are three reasons for expensive certifications: to ensure that one invests so much in certification that they will never recommend any other product; to enable certification vendors to claim large numbers of certified professionals supporting their products; and the money it brings the vendors. In my experience these are typical criticisms. In my experience, however, comments such as these are in the main cynical comments expressed by a "vocal minority" not successful in certification attempts, employment applications, or job advancement. In the early 1990s, Novell boasted the most certified professionals. One just needs to consider the significant trend toward

products other than Novell to doubt the first claim. Knapp and Gallery (2003) help refute the third saying that certification is not a significant revenue stream, but adds however, that it can spawn additional revenue streams (see also Peluso, 2000). In my view, the second claim is a positive affirmation!

While the interview subjects did not believe that this criticism is literally true, as a comment it does hold some validity. Their general response to this criticism, however, was a proverbial “so what?”. The benefits accrued by the certification vendor include product and channel support, the maintaining of standards, and a community of knowledgeable professionals who will promote the product or service. This, in the view of the sample, is positive. They were quick to warn, however, that certification should be based on ability, not numbers, and that adequate channel and product support must indeed be provided.

6.2.5 Cost

There is, of course, a cost to certification, with some costs being considerable. For example, as mentioned in Chapter 4, the Cisco’s CCIE lab exam costs in excess of \$US1,000.00, and may require considerable travel to a testing centre. (Cisco Systems, 1992-2005; Joss, 2001). There is also a cost to continuing re-certification or certification re-validation to be considered. Robertson (2003) argues cost as a disadvantage, but believes that cost is significantly outweighed by the benefits. Ireland (2003), however, says that few people question either the cost and return on investment of certification given the considerable benefits as discussed above.

None of the interview subjects considered the initial cost of attaining a certification to be either a deterrent or a criticism. There was a general feeling, however, that any excessive re-certification costs, that is to keep a given certification current, may not be justified, especially for those technologies that no longer enjoy a significant market share. The issue then becomes a cost-benefit analysis to determine if a relevant certification is justified.

6.2.6 Conclusions

So called “paper” certifications hold value at entry level, according similar career advancement benefits. To the wider stakeholder community, however, they are perceived as being of lesser value than certifications with some experiential and/or practical content. Some certifications are relatively easy to attain. These are perceived by stakeholders as being of a lesser value than those with a more robust and demanding attainment programme.

It is generally disputed that certifications are a waste of time for those who already have experience within the domain of the certification. A certification validates and proves existing knowledge, updates to current technology, and provides wider career advancement opportunities. I contend, therefore, that a certification has significant value to those who already have the experience.

While certification providers do indeed accrue significant benefits, these are offset by benefits to the certified community and consumer by way of channel and product support. A certification provider must ensure, therefore, that such support benefits are indeed provided. If not provided, the certification is devalued in the eyes of its stakeholders.

In my experience, cost was never a deterrent for either a determined individual or a company, even given considerable cost in certifying many employees. This supports the argument that many consider that the cost is significantly justified by the subsequent benefits, for *all* stakeholders. There is, however, the consideration of continued certification and its cost-benefit justification.

The above are the elements that will, if the off-setting benefits are not present, devalue a certification in the perception of its stakeholders.

6.3 Other individual and market perceptions

6.3.1 Vendor-specific or vendor-neutral

Much debate in the literature centred on the issue of the perceived value of vendor-specific versus vendor-neutral certification. In 1993, Cocks (1993) looked forward to the establishment of generic, vendor-neutral certifications,

and until then, he said, personnel managers should increase the experience requirement for job candidates. As pointed out in Chapter 4, many vendor-neutral certifications, however, do not verify experience, for example CompTIA's A+ certification can be gained by candidates with no field experience whatsoever. In my view Cocks was not seeking vendor-neutrality but a practical component in certification programmes, which he also mentions. Cosgrove (2004), in a complementary comparison of academic and industry-based qualifications, states that certified individuals have competence in using the certifying company's products. This comment appears to ignore the objectives of vendor-neutral certification. Cosgrove's mis-made point, however, is that many IT industry certifications are *product-usage-centric*, be that vendor-specific or vendor-neutral certifications. As Eggert (2001) relevantly points out, holders of vendor-specific certifications may have inappropriate skills when transferring to work on a different product.

Also outlined in Chapter 4, Donna Senko, Microsoft's Group manager of certification (as cited in Alexander, 1998b), says that vendor-neutral certifications provide a stepping stone to (their) vendor-specific certification. This comment is obviously skewed to make vendor-neutral certification appear the base level while Microsoft's vendor-specific certification is upper-level. While Microsoft's certification is directed towards support of their products (product-usage-specific), Novell, however, along with their own product-usage-specific exams, has always embraced other technology inside their certification programmes, as well as vendor-neutral content (see Alexander).

The interview sample was divided on this issue, ranging from the view that all certifications should preferably be vendor neutral, to the view that it does not matter. Petteri reflects the middle ground saying that vendor-specific certifications have a greater advantage in an environment dominated by that vendor's product, whereas vendor-neutral certifications relate more to proof of general capability similar to an academic course. The majority of the interview sample take the view that the strengths of each type relate directly to the needs of a given situation.

6.3.2 Conclusions

These arguments do not lead anywhere, except that there is a place for both vendor-specific and vendor-neutral certifications. It is a proverbial “horses for courses” scenario based on the certification programme’s objectives. Dale’s perceptive view is that if one wants Microsoft certification one goes to Microsoft. On the other hand, while project management is not product specific, a project management certification that tends to focus around the certification vendor’s own particular methodology does not carry the same value to its stakeholders (D. Corlett, personal communication, April, 2006).

I posit that the reason why this debate appears to lead nowhere is that it is two-dimensional, and that there are two further dimensions: product-specific and product-neutral. Once these dimensions are added the issue of stakeholder value of a given certification becomes clearer. This I will illustrate in Figure 17:

	Vendor-specific	Vendor-neutral
Product-specific	A	B
Product-neutral	C	D

Figure 17: Dimensions of product and vendor specificity and neutrality.

If one accepts Dale’s and David’s above comments as true, then the two shaded cells (quadrants A and D) represent perceived higher-value certifications than certifications that are categorised within the non-shaded cells (quadrants B and C). This argument is supported by evidence from my experience. In the early days of Internet and WWW (World Wide Web) certifications, Novell’s product-specific/vendor-specific certifications (quadrant A) enjoyed extremely high levels of perceived value and demand. Novell introduced several Certified Internet Professional (CIP) certifications which failed to attract significant market share. These vendor-specific but product-neutral certifications (quadrant C) were quickly overtaken in the market by a vendor-neutral

product-neutral Internet and World Wide Web certification, CIW (Certified Internet Webmaster)⁴³.

Despite some in the literature reporting a trend towards a range of product-specific certifications from vendor-neutral providers (quadrant B), and advocating such certifications, this is not supported by either the majority of the interview sample, nor by my experience. While Inforplex were authorised for product-specific vendor-specific certification programmes from Novell and Lotus, their product-specific Microsoft programmes were sourced from a vendor-neutral provider (quadrant B). These programmes suffered from a lack of credibility. While the end result was a vendor-specific certification from Microsoft themselves, the overall certification programme was perceived as having a lesser value. Quite simply, it was not from Microsoft.

While one might argue that Microsoft is more about numbers and less about pedagogical quality⁴⁴, it remains true that their certification programmes (quadrant A) are perceived as having a higher value than Microsoft certification programmes from other vendors (quadrant B).

The above evidence supports the notion that product neutral certifications have a higher perceived value when provided by vendor neutral organisations such as professional associations, foundations, and the like. These would be quadrant D certifications. Similarly, product specific certifications have a higher perceived value when provided by the product vendor (the manufacturer of the product). These would be quadrant A certifications.

6.3.3 Performance-based certifications

There can be no doubt that all of the literature relating to this theme accorded a higher value and respect to certifications that had practical content-based assessment. For example, Cocks (1993) writes that he looks forward to the establishment of performance-based certification. Joss (2001) notes a trend towards performance-based certifications - a trend, she says, likely to become a

⁴³ Novell's CIP was eventually merged into CIW. ("Novell's CIP Certification" 2000).

⁴⁴ This is not necessarily the view of this researcher. As has been stated, this research does not endeavor to evaluate any individual certification or certification provider.

standard as the IT world matures. And, according to Ireland (2003), knowledge-based examinations measure a candidate's understanding of vocabulary, a body of knowledge, and some practices, whereas performance-based certification, which may include a sample of a candidate's experience, infers an ability to perform tasks at a given level, giving a greater degree of assurance and value.

While one interviewee did not believe there were any true performance-based assessments all the interview subjects generally concurred that while these would be more expensive, and be at a higher level of technicality, they would consider them of a greater value.

Probably the most respected certification with practical content-based assessment is Cisco's CCIE (outlined in Chapter 4). Bean (as cited in Clancy, 2003) believes that it is probably the most rigorous certification available as it requires other certifications as prerequisites. Novell's practicum exams (Novell Training Services, n.d.; Seamons, 2000) are also an example of the trend toward practical-based certifications, as is Microsoft's Architect certification that includes a minimum time spent in the industry and a review process of one's credentials and skills.

6.3.4 Conclusions

Based on the arguments presented above and the data gathered in this research, there is definite value in practical content and/or an experiential content as a prerequisite to attaining a given certification, and that such certifications enjoy a higher stakeholder value. The Collins Dictionary and Thesaurus (1987) describes *pedagogy* as the principles, practice, or profession of teaching. *Pedagogy* is described by Wikipedia (Wikipedia, 2006c) as "the art or science of teaching" (para 1). While other meanings of *pedagogy* exist, this appears to be the generally accepted modern meaning, and is the meaning that is used within this thesis. It is generally acknowledged that sound *pedagogy* includes significant elements of practical or experiential-based content in the teaching programme. I contend, therefore, that industry certifications with significant

practical and/or experiential content are more pedagogically robust as well as according high stakeholder value.

6.4 Programme models and variances

6.4.1 Elements of a certification programme

Within this theme, all data was gathered from descriptions of certification programmes in the literature. From these descriptions, and confirmation from my own experience, the model illustrated in Figure 12, and repeated here for convenience as Figure 18, was developed. This model illustrates the typical and less typical elements that make up any given certification programme, to a greater or lesser extent.

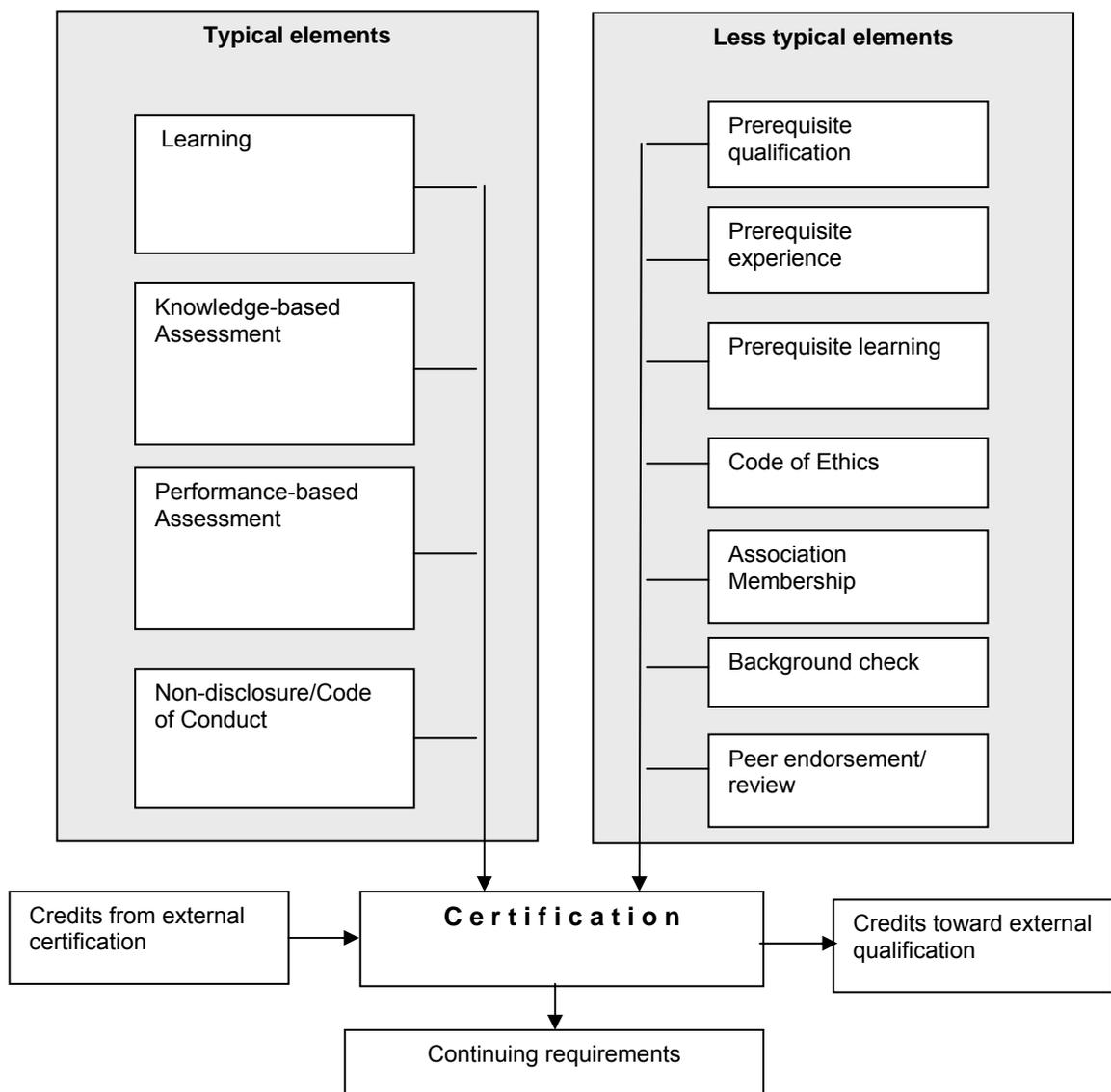


Figure 18: Typical and less typical certification programme elements

Typical elements

These are the elements typically found in any certification programme. As has been seen in the above discussion, the performance-based element may not be present at all, especially at the entry level. The learning element may be excluded at the behest of the certification candidate, especially if they already have extensive experience within the domain of the certification. In my experience, however, there is typically some form of learning, to a greater or lesser extent depending on the candidates existing knowledge and experience.

As discussed above, the value to its stakeholders and pedagogical robustness of a given certification can be measured on the substantiveness of performance-based elements within the certification programme. Using the same definition of *pedagogy* discussed above, I argue that the robustness and substantiveness of the remaining elements will also measure the value to stakeholders and pedagogical robustness of a given programme. The more robust and substantive, the greater the value and pedagogical robustness.

The element “Non-disclosure/Code of Conduct” is discussed further in the following section, “Assessment issues”.

Less typical elements

These are elements that may not necessarily appear in a given certification programme. Many certification programmes do not have these elements but are nonetheless highly regarded. Using the same reasoning already discussed, the existence of any of these elements, however, serve to increase the value to stakeholders and the pedagogical robustness of the programme, to a greater or lesser extent depending on the robustness and substantiveness of the element. This is especially the case for prerequisite learning and prerequisite experience with regards to both value to stakeholders and the pedagogical robustness. The same applies to peer endorsement or review with regards to value to stakeholders.

6.4.2 Assessment issues

Assessment issues are a highly significant factor in the perceived value to stakeholders and pedagogical robustness of any certification programme. While the pedagogical issues surrounding assessment per se is beyond the scope of this research, I argue that there is no difference between the *process* of gathering evidence to measure or make a judgment about a certification candidate's knowledge and/or performance than that of an academic student's. Furthermore, I contend, there is a multiplicity of ways to carry out certification assessment.

Similarly, certification assessment should also be based on the same fundamental principles of validity, reliability, fairness (is unbiased), and appropriateness (Popham, 1999). The more rigour associated with the assessment process, the greater the value to stakeholders of the subsequent qualification and the higher the pedagogical robustness.

A second highly significant factor is maintaining *security and integrity* of the assessment process and data. As detailed in the literature review analysis, Chapter 4, significant steps are taken by some certification candidates to cheat: to try to thwart, or seek the assistance of others to help thwart, test centre security; to hack into the testing system to manipulate results; and to repeatedly take the same exam in order to remember exam questions to pass on to others. As was also detailed in Chapter 4, significant steps are taken by certification providers and test centers to maximise security, including the requirement for candidates to sign a non-disclosure agreement or code of conduct. Similarly, test centers are required to follow strict physical and technical security measures. It is up to the exam centre in these cases to maintain their integrity and ensure such measures are rigorously enforced.

Certification providers must, and indeed do, rigorously maintain security measures, such as adaptive testing that cycles different questions according to the candidates previous response and applies higher grades according to the speed of response in an effort to reduce the memorisation of questions. In some scenario-type assessments, hand-written responses are required. Additionally, certification providers should, and indeed do, take determined measures such

as de-certification, the closure of “brain dump” web sites containing exam questions, even prosecution, of those found to have cheated or otherwise thwarted security.

Philosophical considerations

Melrose (1996) presents three paradigms of curriculum development: functional, transactional, and critical, each with their own underlying philosophical bases which, she says, are “commonly recognised in many fields of education...” (p. 49). The functional paradigm is set in the present to match what industry or the person seeking a job needs now. The transactional paradigm is based on the needs of the learner group particular to a course of study and may involve negotiated objectives. The critical paradigm is based on future needs and the development of critical thinkers. Clear and Young (2004) have adapted these paradigms to assessment. While an academic institution may adopt any or all of these paradigms within their curriculum and assessment programmes, industry certification clearly conforms to the *functional* paradigm.

6.4.3 Conclusions

I contend that the fundamental principles of assessment of validity, reliability, fairness, and appropriateness (Popham, 1999) apply equally to both academic and industry certification assessment; that, conceptually, within the functional curriculum paradigm, there is no difference. I argue, therefore, that given the presence of these principles, the higher the level of rigour and legitimate adherence to Melrose’s (1996) functional paradigm that underpins a certification programme’s assessment process the higher the value to stakeholders and the pedagogical validity of the certification.

Similarly, the higher the levels of physical and technical security of assessment and assessment data, and integrity of assessment delivery, the greater the value to stakeholders of the certification.

6.4.4 Integration with academic curricula

As detailed in the literature review analysis, Chapter 4, there are many, examples of the integration of industry certification with academic curricula.

As mentioned, the Cisco Networking Academy and the Microsoft IT Academy provide curriculum materials to academic institutions and will train teachers to deliver the curriculum. The academic institution must become a member of the respective Academy programme, and fulfill certain requirements. This is probably the highest level of industry certification integration. In his thesis, Alford (2005) discusses the differences between the philosophical underpinnings of education⁴⁵ and training⁴⁶, suggesting that while academia is more learner-centric, industry training is more instructor-centric (Alford). This, in my view however, may be more to do with regional differences. The case referred to by Alford compares Cisco curriculum and instructor training with prevailing local New Zealand pedagogical practices. In my experience, curriculum sourced from the U.S.A. tended to be instructor centric, while curriculum sourced from the U.K. tended to be more learner centric. It was common for certification instructors in my charge using curriculum materials provided by the certification vendor to amend their teaching practice to suit local pedagogical standards. The objective was not to follow the pedagogy implicit in the curriculum materials, but to impart the knowledge according to best local practice to enable learners to pass the assessments. The above, of course, is mostly generalisation, is outside the scope of this study, and requires further research.

Furthermore, as argued in the previous conclusions (Assessment), industry certification falls within the functional paradigm (Melrose, 1996), which I contend aligns to the definitions of training (as stated in the footnotes). While,

⁴⁵ Collins Dictionary and Thesaurus (1987) defines "education" as "...3. the act or process of imparting knowledge to, esp. at school, college, or university". Wikipedia defines "education" as "the development of individuals' capacity to be happy, successful, and become a productive member of the society" (Wikipedia, 2006a).

⁴⁶ Collins Dictionary and Thesaurus (1987) defines "training" as "1. a. the process of bringing a person etc. to an agreed standard of proficiency etc. by practice and instruction". Wikipedia defines "training" as "the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relates to specific useful skills" (Wikipedia, 2006e).

it could be argued, the definitions of education align to all three of Melrose's (1996) paradigms, clearly, I contend, however, there is a philosophical match with the functional paradigm. Again, this requires further debate beyond the scope of this particular research.

Clear (2002) discusses the trend towards consumerism, and the challenge faced by academic institutions to regard students not as *consumers* as many students would prefer, but as *participants* (Horsburg, as cited in Clear). Clear suggests that in the case of private commercial training establishments (PTEs) the effects of consumerism dominate and they operate under a consumer culture. This is certainly the case from the perspective of the PTE itself, however it is not necessarily the case from the perspective of many certification programme providers. In my experience, Novell Education (now Novell Training Services), Lotus Education (now IBM Training and Certification), and Microsoft Learning, conceding that they are all divisions of large *commercial* organisations, base their training materials and content, and their instructor certification programmes (instructor certification has a didactical requirement) on similar sound pedagogy as present in academic institutions. Additionally, Novell, as one example, maintains an extensive certified professional community discussion base and holds regular symposia, and feedback from their certified community helps build, improve and develop their training and certification programmes, as well as being a communication link between consumers and Novell (G. Houston, personal communication, May 13, 2005; see also Novell Brainshare, 2005). Other certification providers have similar professional communities. This, I argue, makes *certification* consumers also participants.

Clear, nevertheless, believes that the best way forward may be collaborative partnerships between academic institutions and the private training sector. Note again Cisco's partnership with post-secondary schools in Canada, Waikato Institute of Technology, and the University of Technology in Sydney.

The conclusions to this discussion are included in the conclusions for the following section.

6.5 Recognition

6.5.1 Comparison to academic qualifications

Au (as cited in "On the right track", 1999) believes that professional certifications are complementary to basic academic degrees, as degrees set a path for a career but are insufficient to furnish specific skills. Cosgrove (2004) notes that while academic institutions give students a well-rounded academic base to enable them to move into industry, industry certification adds competence to use specific products. Montante and Khan, 2001, state that "certification establishes a standard of competency in specific areas and job roles" (p. 371).

These arguments are supported by the interview data. James points out that his certifications extended his credibility into areas not covered by his academic degree. Neville says that a certification is quicker to attain, thereby better keeping up with market demand.

As mentioned earlier, in some specific situations the industry certification becomes the more relevant.

6.5.2 Conclusions: Integration with and comparison to academic curricula

I argue that there is no evidence to suggest that industry certification cannot be successfully integrated into academic curricula. Indeed, due to the unrefuted complementary nature of industry certification and academic qualifications as found in this research, it is in the interests of the academic institution to give serious consideration to such integration if a given certification is also complementary to the objectives of the given curriculum. This, I suggest, is the subject of further research into each individual case.

6.5.3 Continued certification

As outlined in Chapter 4, Bean (as cited in Clancy, 2003) says that the average IT technician who obtains certification will get between four and five certifications in their lifetime. He points out that many people certified in a particular technology will, if that technology declines in popularity, become

certified in the newly popular technology. The example of many Novell certified professionals obtaining Microsoft certifications, while still keeping their Novell certifications up to date, is a case-in-point, he says. The above view concurs with my own experience and with Gow's and Folkes' personal stories (Chapter 1, section nine). Further, the range of certifications held by each of the certification holders interviewed supports this.

The interview subjects further support Bean's (as cited in Clancy, 2003) view that such people will seek and obtain certifications in a new technology, given that they may also allow their certifications in a declining technology to lapse. While a technology remains current and popular, technicians will seek and attain any continuing certification requirements to ensure their credentials remain updated.

While the cost of some continuing certification requirements may be insignificant, in some cases they are not if the updated technology is substantive. Similarly, as discussed earlier, the cost of another, different certification may be high when calculated in terms of time as well as actual cost.

6.5.4 Conclusion

This is further evidence that industry certification has value, especially to the certification holder and to employers who pay directly or reimburse their employee for the training and certification costs.

6.5.5 "Professional" designation

While one writer attempts to discern between *professional* (product- and vendor-neutral) and *proprietary* (product- and vendor-specific) certifications, many refer to *industry certification* and/or *professional certification* without making a distinction. Some, on the other hand, make the distinction between product-specific certification as *industry certification*, and product-neutral certification as *professional certification* (D. Gotterbarn, personal communication, July 9, 2006).

Using the four-dimensional matrix in Figure 17, Figure 19 illustrates this. Certifications in quadrant A are *industry* certifications (or, according to Pierson, Frolick, and Chen (2001), *proprietary* certifications); certifications in quadrant D

are *professional* certifications. Certifications falling into quadrants B and C are either *industry* or *professional* according to their degree of product or vendor specificity or neutrality respectively. I will refer to this as the “certification paradigm”.

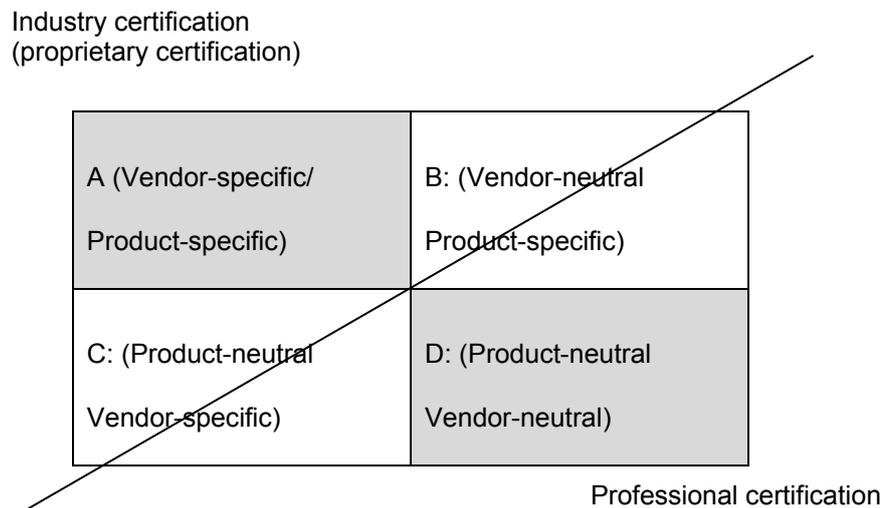


Figure 19: Delineation of *industry* and *professional* certification. The certification paradigm.

A scan of the usage of both terms in the literature does not corroborate this distinction. Nor does Wikipedia (Wikipedia, 2006d) make the distinction. According to Wikipedia professional certifications are often referred to simply as certification, and are awarded by professional bodies and *corporations*. This non-delineation is further strengthened by Microsoft’s and Sun Microsystems’ *Certified Professional* programmes for product-specific certifications (or the delineation is further confused by this depending upon one’s viewpoint).

6.5.6 Conclusion

If one accepts Cegielski et al.’s (2003) conceptual model of professionalism (see Figure 1, page 17), one must also accept that all certification holders are professionals within the domain of their certification, regardless of one’s viewpoint regarding *industry* or *professional* certification. I contend this model is indeed valid. Nevertheless, questions remain. Technicians perform highly directed work – or do they? How much autonomy does a certified professional have in reality? These questions become the subject of further study.

For purposes of distinction between vendor-and product-neutral and vendor-and product-specific certification, distinction between the use of the terms *professional* and *industry* certification may be useful. The use of *professional* certification by Microsoft and Sun Microsystems, and the blurring of that distinction by Wikipedia have, however, blurred that distinction to the point where the term professional certification appears to have become a de facto term for all certifications. One could argue that using the term “professional” appears to accord the certification a higher status. The term “professional”, therefore, is used as a marketing tool.

6.6 Programme implementation and administration

Discussion and conclusions

This category does not lend itself to debate, as the data collected within this category pertains to standard business models for any typical business, and in particular the business of providing industry certifications. All data collected is from the literature, and is based on the experiences of experts in this field.

The data outlined in Chapter 4, section five, are the business requirements, processes and other relevant issues for the implementation and administration of a rigorous, valid, and defensible certification programme. In particular, the following publication is recommended: Hale, J. (2000). *Performance-based certification: How to design a valid, defensible, cost-effective program*. San Francisco: Jossey-Bass Pfeiffer.

Figure 20 on the following page, developed from the data within this category, illustrates a typical certification programme project using elements of implementation and administration from the literature as outlined in Chapter 4.

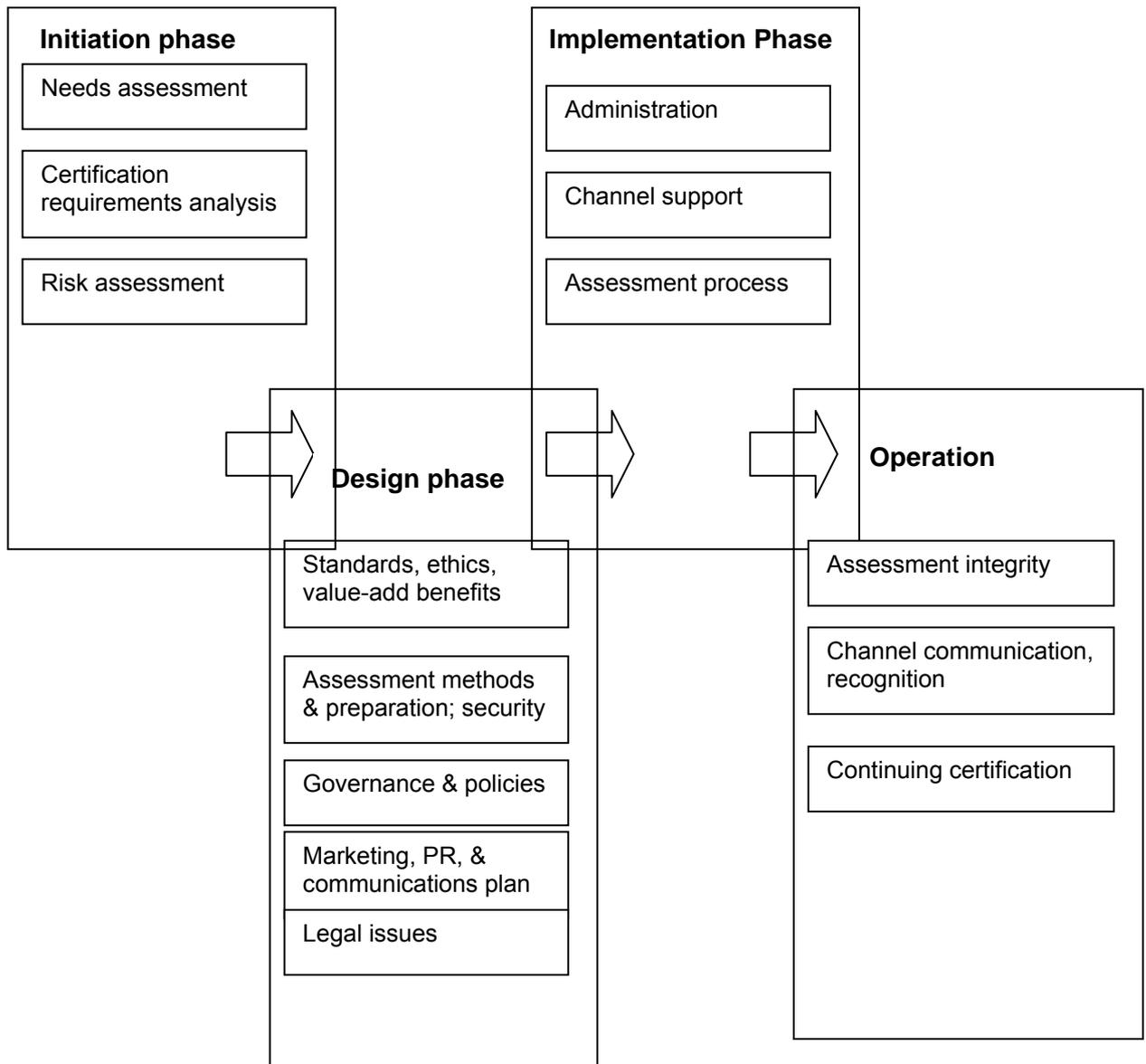


Figure 20: A typical certification programme project

As further outlined in Chapter 4, section five, Ireland (2003) argues that certification authenticates someone meeting the established standards of the certification programme “through rigorous testing, examining, and reviewing the candidate’s knowledge, attitude, experience, and skills” (para. 22). He says that the means of measuring this value is a match between consumer needs, and what is offered in the certification programme. The process, he says, must have content validity, and that the value of a certification is equal to the perception of its worth from different perspectives. I contend that these perspectives *include* the rigour of the certification programme and the relevance and validity of programme content.

6.7 Regarding the methodology

The use in this research of a joint methodology, namely phenomenography and Interpretive Phenomenological Analysis (IPA) may invite some debate, even criticism. In January, 2006, I introduced the methodological approach for this research, albeit in its embryo stage, at a symposium (*Researching Phenomena: Three perspectives, three cases*) attended by a small gathering of AUT University staff from the School of Computer and Information Sciences, the School of Education, the Centre for Educational and Professional Development, and a visiting expert in phenomenography from Sweden. Comments following the presentation were supportive. In July, 2006 (at this stage the research had been completed), I presented the methodology to a small gathering of academics from the tertiary sector at the 19th Annual NACCQ Conference (see Hitchcock, 2006). Again, all comments were supportive, with no debate or criticism of the methodological approach ensuing. A presentation is to be made on the methodology used in this research along with an overview of the findings at the EARLI SIG⁴⁷ Workshop 2006, December 7-9 in Hong Kong. Appendix G is the proposal paper. This workshop will be attended by preeminent, international experts in the field of phenomenography.

6.8 Summary

The above discussion and subsequent conclusions are constituted within each of the main themes within the categories of meaning of industry certification. It identifies the factors that add value to the stakeholders of any given certification and those factors that may serve to detract from the value. Furthermore, the factors that make up the pedagogical validity of a certification programme are similarly identified. The relative effect of these elements on the stakeholder value and pedagogical robustness is illustrated in Figure 21. Figure 21 further illustrates the effect of the learning element, which, I argue, serves to further raise the overall value and pedagogical robustness.

⁴⁷ European Association for Research on Learning and Instruction Special Interest Group 9: Phenomenography and Variation Theory.

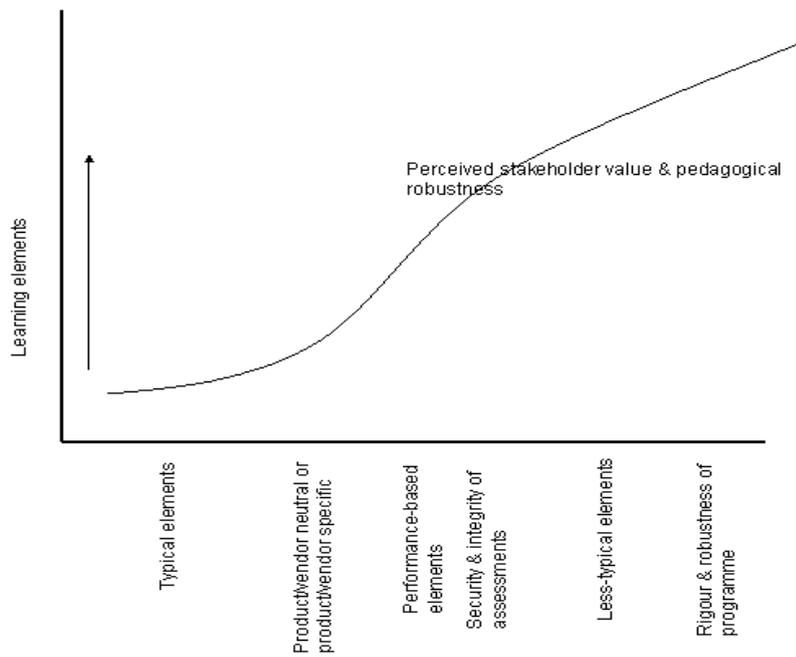


Figure 21: Value and pedagogical validity of industry certification (adapted from Hitchcock, 2006, p. 113).

In the following, final chapter, recommendations drawn from the above conclusions are presented, along with recommendations pertaining to SoDIS, and general recommendations from the research.

Chapter 7: Implications and recommendations

7.1 For the individual

While there are many significant benefits for individuals, certification candidates must ensure they choose the correct certification. This choice will, naturally, depend upon the particular domain of the required qualification, and the product or service within that domain for which the candidate wishes to become credentialed. Individuals can maximize the value and pedagogical validity of their proposed credential by selecting a certification provider based on the value and pedagogical elements as illustrated in Figure 21. The individual can also check the integrity of the assessment delivery centre, that is, for compliance to the required security procedures.

Once a certification has been attained, the certification holder can maximise the ongoing benefits by becoming involved in forums and networking opportunities provided by the vendor or professional community, and by attending key industry events, symposia, and conferences. They should exploit and maximise the networking and communication channels available within the certified community of that certification domain.

7.2 For employers seeking certified job candidates

Employers should be aware of the complementary aspects of industry certification and academic qualifications as discussed above. In this way, employers can place the emphasis on the academic qualification if the job requires broader, deeper, domain-wide knowledge, or on certification if the job requires specific product, service, or process knowledge within that domain, or both.

Employers must be aware, however, that a certification does not necessarily prove competency. Practical-based certification programmes, or programmes with experiential content, may indicate a level of practical skill, however, the level of that skill will depend on the amount and rigour of practical or experiential programme content. Employers should research the given

certification, and use the stakeholder value and pedagogical robustness graph in Figure 21 to measure the worth of the certification. Employers should also be aware that it is just one criterion for candidate assessment.

Employers are able to use their employees' certifications in the promotion of their products and services. This gives confidence to customers that they will be receiving professional service from knowledgeable people. Once on the job, however, it is the practical application of that knowledge and professional service that counts.

Employers can also use certification to up-skill or validate the knowledge of existing employees, or use certification to introduce and gain knowledge in new technologies.

7.3 For academic institutions

Academic institutions can be confident that many certifications are pedagogically sound, and will add real value to their own curricula. Furthermore, given that the objectives of the certification match the objectives of a given paper or domain within a curriculum, and given that there may be some philosophical issues to consider as discussed in the previous chapter, such certifications can be easily integrated in a fashion that is complementary to the institutions core curriculum or programme. While it may not be in the institution's curriculum model, or its interests, to provide the assessment delivery for certifications, the precedent has been set that they indeed could. Wellington Institute of Technology is an Authorised Testing Centre for both Thomson Prometric and Pearson VUE (Wellington Institute of Technology, 2006), and has been (as CIT) since circa 1990. These external assessments, whether taken intramurally, or at an outside assessment centre, given that the assessment aligns to the paper's learning outcomes, may substitute for internal assessment.

I recommend research into specific cases. Furthermore, research into philosophical and other issues highlighted in the discussion in the previous chapter will inform and support a robust integration.

7.4 For those organisations seeking to establish a certification programme

This thesis provides the findings of in depth research into the essence of industry certification *and* the way industry certification is perceived by its stakeholders. It therefore provides a basis for initiating, developing, implementing, and operating a rigorous, pedagogically robust certification programme with value to its stakeholders.

7.5 For SoDIS

Risk management and ethics certifications exist in the plethora of certifications. Boston University offers a risk management certification aimed at project portfolio managers to analyse the risks involved in certain projects (Boston University Corporate Education Center, 1997-2004). This programme appears to be complementary to SoDIS risk assessment rather than competitive. Other risk management certifications include: the financial industry (BAI Center for Certification, 2005); the healthcare insurance industry (through Ohio University) (OHIC Insurance Company, 2005); realtors and brokers (San Diego Association of Realtors, 2004); and an enterprise risk management certification (in conjunction with the National University of Singapore) (National University of Singapore, n.d.). Note the association with academic institutions. The Ethics Institute of South Africa offers an ethics certification (Ethics Institute of South Africa, 2005).

According to the Professional Risk Manager's International Association (PRMIA), their PRM certification "has overtaken all other risk certification programs" (The Professional Risk Manager's International Association, 2004, para. 1). PRMIA, a non-profit professional association, offers their members;

sound risk management practices, increased awareness of ethical issues and standards of conduct, certification of your skills, access to professional development programs and the opportunity to participate in multiple networks for the free exchange of ideas with your peers ("About PRMIA", 2006, para 2.).

This certification may be a possible rival to a SoDIS certification. This description, incidentally, describes a programme that has stakeholder value and is pedagogically sound according to the findings of this research.

There are also a number of security risk certifications.

While the PRMIA certification may possibly be competition to a SoDIS certification, the SoDIS risk assessment process stands out, as its primary focus is on ethics-based risk assessment. Therefore, and based on the findings from this research, I believe that an industry certification is an appropriate credential for the SoDIS analysts and teachers. I recommend that the certification be vendor-neutral. While the SoDIS process uses a software product, the SPA CASE tool, it is integral to the overall SoDIS methodology. The paradigm recommended therefore is a *professional* certification with the certification sponsor and provider being the Software Development Research Foundation (SDRF), the sponsors of SoDIS. The certification should incorporate stakeholder value and pedagogical robustness elements as appropriate to the requirements of the certification.

As SoDIS is currently becoming integrated into many academic curricula, and in fact arose from within academia, it is further recommended that this be retained as the primary method of learning. Assessment may be administered by the academic institution through the SDRF, or direct with the SDRF.

7.6 Regarding the methodology

I posit that, while the objectives of Phenomenography and IPA are fundamentally different, that is the one seeks to discover the essence of actors understanding of a phenomenon and the other seeks to discover the essence of the phenomenon itself, the two methodological approaches are highly complementary in their methods. Consequently, these two methodologies lend themselves well to being used as a joint methodology approach to discover both the understanding of a phenomenon and the phenomenon itself.

I recommend that the joint Phenomenography/IPA approach be used and further developed in research that has appropriate research aims.

Note: The following two sections have been added after reflection of an examiner's (anonymous) comments:

7.7 Research limitations

The following has been identified as limitations to this research:

1. It is possible that the value of a certification is less the content and more the signaling of an attitude, for example the valuing of continual learning. Perhaps the already experienced certification holder or candidate is able to advance still further by seeing examples and multiple details within a larger framework.
2. Due to the constraints of a Master's research project, a second coder was not used which would have given further rigour to the coding of categories.
3. Notes were used to record interviewee responses rather than audio tapes and subsequent transcripts.
4. All interviewees were highly qualified and associated with high quality certifications giving the sample relative homogeneity. The sample was quite small. Certification holders who remain unemployed were not interviewed. There were no literature pieces reviewed that were associated with unemployed certification holders.

7.8 Future research recommendations

This following is a summary of further areas of possible research and/or debate identified in this thesis:

1. The propensity for increased remuneration arising directly from gaining a certification.
2. Prevailing pedagogical practices in the delivery of certification training.
3. Philosophical foundations of industry certification teaching and learning (see Melrose, 1996).
4. Specific certifications that can be integrated into academic curricula.
5. Are there possible combinations of certifications (perhaps some product-specific and some product-neutral) that provide synergies and create additional stakeholder value?
6. How do the costs of certification reflect the division of benefits between certification holder, employer, and certification vendor?
7. The areas identified in limitation one above.
8. The use and further development of the joint Phenomenography/IPA research methodology.

7.9 Summary

As has been stated, this research does not attempt to identify and rank individual certifications for their stakeholder value and pedagogical robustness. Furthermore it is not within the scope of this research to attempt this. As this thesis, however, presents a blueprint for a method of such ranking, this exercise could indeed be carried out. There are, however, as has also been stated, thousands of certifications. While this is the case, the number of widely popular and “in demand” certifications are not significantly great. This exercise would therefore be feasible.

This research has identified the elements of perceived stakeholder value and pedagogical robustness of industry certification. It has also identified elements that detract from the perceived stakeholder value. These perceptions have been taken from the point of view of both the understanding of industry certification by “players” within the industry, and of industry certification itself, and based on the experiences of players within the industry. The findings make several recommendations for individual certification candidates and certification holders, to employers, to academia, and to those organisations seeking to establish a certification programme. Further, it outlines the implications and makes recommendations regarding a SoDIS certification.

As outlined above, many areas of further investigation and research, by myself or any interested other, have arisen from this study and provide bases for further publishable papers. The phenomenography methodology and findings outlined in this thesis provide a foundation for my anticipated PhD.

Personal Communications

Corlett, D., April, 2006

Gotterbarn, D., July 9, 2006

Gow, J., April, 1994

Gow, J., June, 1997

Houston, G., May 13, 2005

Shaw, D., September 1, 2005

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Appendix A: Participant Information Sheet

Participant Information Sheet



Date Information Sheet Produced:

10 April 2006

Project Title

The educational value, validity, and benefits of, and an appropriate structure for industry certification as a recognised and valued qualification

Invitation

This document invites you to participate in the research associated with this project. Participation is entirely voluntary.

Researcher

Leo Hitchcock
School of Computer & Information Sciences
Auckland University of Technology
921-9999 ext 5421
leo.hitchcock@aut.ac.nz

What is the purpose of this research?

This research aims to determine if an industry certification is a pedagogically sound form of education, and, if so, if it is appropriate for the SoDIS risk assessment process and procedure, and the SoDIS Project Auditor (SPA) CASE tool, jointly referred to here as the SoDIS methodology. Second, the research examines how such a certification can be positioned within current certification models and practices. Information being sought is both an analysis of the experiences and perceptions of the actors within the certification industry, as well as the certification industry itself as replicated in the literature and from data collected in interviews with industry actors. The research will provide data that will strengthen the rigour, market validity, programme validity and value, and the overall success of a SoDIS-based certification programme.

SoDIS (Software Development Impact Statements) is a process of ethics-based risk assessment for software development and other projects. The SoDIS inspection process identifies the possible stakeholders, and the downstream impacts of risks to stakeholders and stakeholder groups, including the public, that may be introduced in the project initiation phases. Additionally, the SoDIS process strengthens the integrity of final deliverables as it indirectly focuses attention on much of the process thereby circumventing process-based risks.

This research will result in a Thesis as part of a Masters of Education degree. Additionally, parts of the research findings may result in publications and/or presentations in an academic context.

How are people chosen to be asked to be part of this research?

While data for this research is primarily from literature reviews interviews with certification holders and employers will be held to verify analysed data. People who are known to the

researcher as holding an industry certification or is the employer of a person holding an industry certification will be invited to participate. These people may then nominate further participants not known to the researcher.

While the domain of the participants' certification is not relevant, the researcher will be operating primarily in the Information Technology (IT) domain. Should a participant hold a certification from a different domain this will still be relevant to this research.

What happens in this research?

During March and April 2006 participants will be invited to either, of their choice, a face-to-face or electronic in writing by email interview about their experiences of industry certification.

What are the benefits?

This research will benefit those organisations or sponsors wishing to design and develop a pedagogically (the principles and practices of education) sound industry-based certification programme, including the sponsors of SoDIS. It will also benefit those prospective certification candidates who wish to choose a pedagogically sound certification or certification delivery organisation.

How will my privacy be protected?

You may be requested for your permission to use quotations from the interview data. In this case your name will appear cited in the Thesis and relevant publications that arise from it. If you wish that your data remain confidential this confidentiality will be respected and your name removed from all documents associated with this research. For those participants requesting confidentiality codes will be used rather than names on interview notes. The list of codes that cross reference to the participant will be kept by only the researcher for the duration of the research then will be destroyed by shredding. Any comments arising from your interview will be general and not specific, or cited as, for example, "participant A". While the interview sample is small, participants are part of a much larger community of certification holders. There is little likelihood that anyone could be identified by any detail in the thesis or in publications, however due to the nature of this community there remains the possibility that your identity may be recognised.

What if I wish to withdraw from the research?

This may be done at any time in writing (including email). In the case of withdrawal, you may elect, again in writing, that the researcher retains all information already gathered and use it according to the provisions contained within this information sheet, or you may request that all information gathered from you be immediately destroyed by shredding.

What are the costs of participating in this research?

Time, and possibly travel only. Time will be limited to one x one hour interview, and a follow up contact for clarification of no more than a further one hour in total which may in smaller multiple time segments. It is envisaged that the interviewer will travel to you, however you may elect to travel to a neutral location agreed between yourself and the interviewer.

What opportunity do I have to consider this invitation?

You will be contacted again one week following this initial invitation for your acceptance or otherwise if the consent form (attached) has not been returned within this time.

How do I agree to participate in this research?

Please complete the attached Consent Form.

Will I receive feedback on the results of this research?

Yes. You will receive a copy of the written-up notes from your interview for review. You will then be able to read and make changes to these notes (if necessary) and verify/confirm them as an accurate account of the interview. You may also request a copy of any relevant publications prior to their publication, and/or the relevant Thesis section/s.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Richard Smith, Programme Leader Postgraduate Programmes, School of Education, Auckland University of Technology. *richard.smith@aut.ac.nz* , 921-9999 ext 7935

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Madeline Banda, *madeline.banda@aut.ac.nz* , 921 9999 ext 8044.

Who do I contact for further information about this research?**Researcher Contact Details:**

Leo Hitchcock
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Project Supervisor Contact Details:

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Approved by the Auckland University of Technology Ethics Committee on 3 April, 2006, AUTEK Reference number *05/246*.

Appendix B: Participant Consent Form



Consent to Participation in Research

Title of Project: **SoDIS certification**

Project Supervisor: **Dr Richard Smith**

Researcher: **Leo Hitchcock**

- I have been told and understand the information provided by the researcher about this research project
- I have had an opportunity to ask questions and to have them answered
- I understand that during the interview notes will be taken and then written up. I shall be given an opportunity to read and verify them.
- I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- If I withdraw, I understand that all relevant written material, notes, or parts thereof, will be destroyed.
- I agree to take part in this research.
- I wish my identity to be kept secret: tick one: Yes No
- I understand that this research will result in a Thesis as part of a Masters of Education degree, and that parts of the research findings may result in publications in an academic context. I further understand that the researcher may request my approval to cite or quote me from the interview notes and will offer to provide the relevant text associated with the citation or quote which will show the context in which the citation or quotation is made. I may decline and remain anonymous, or if my approval is given my name may appear with relevant citations or quotes.
- I wish to receive a copy of the report from the research: tick one: Yes No

Participant signature:

Participant name:

Participant Contact Details (if appropriate):

.....

Date:

**Approved by the Auckland University of Technology Ethics Committee on 3 April 2006
 AUTEK Reference number 05/246**

Note: The Participant should retain a copy of this form.

Appendix C: Interviewer script/question themes

Introduction

The questions I will be asking are general questions on how you perceive Industry Certification, both personally (how it has benefited you), and generally (how you perceive the certification generally, and any weaknesses you perceive in the certification system).

The questions are designed to give us this information in your own words and not assume these things ourselves.

Interview

Section 1 (if an employer with no certifications go to Section 2)

1. What is/are (or was) your certification/s?
2. Why did you obtain certification?
3. Were those outcomes realised?

Yes

No



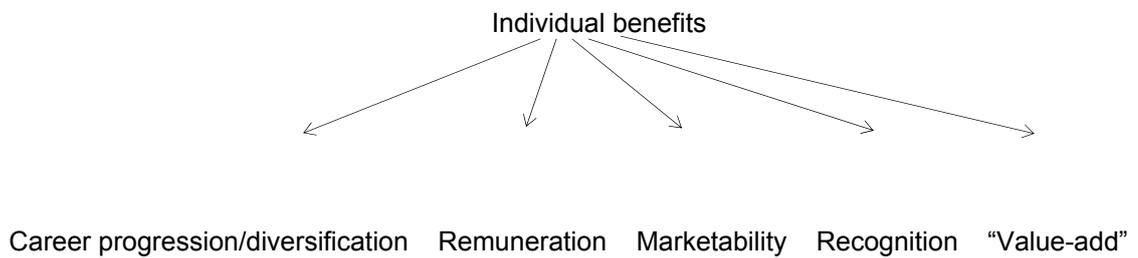
3a) What is/are the reason/s?

4. What other benefits accrued?
5. What are your 'likes' about certification? (Generally, apart from the above)
6. What are your dislikes about certification (from an individual point of view)?
7. Will you continue to pursue further certification/s?

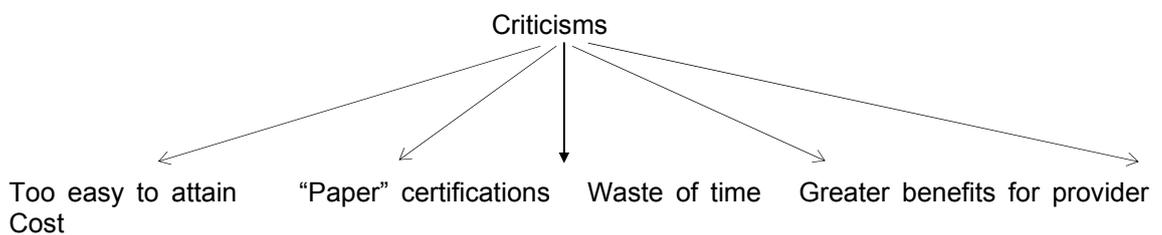
If 'No': Why not?

8. How do you see certification fitting with a University qualification?
9. From the literature research that has been undertaken, the following benefits and criticisms of Industry Certification came to light. First the benefits. What comments do you have regarding the following:

Go through each benefit/criticism in turn omitting those that have been covered earlier in the interview



And the criticisms:



10. What significance does vendor-neutrality have on the worthiness of a certification?

And what significance does performance-based have?

10. Any other comments?

Section 2

As an employer:

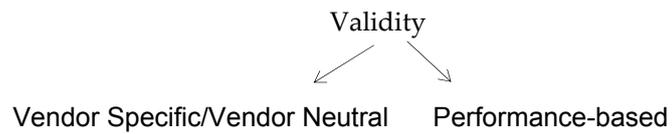
1. How much emphasis do you place on a certification
 - a) In the selection process
 - b) On the job

2. What benefits do you as an employer gain from employing people with a certification

-
3. What benefits do you think your customers get from having people with a certification service them?

 4. What are your dislikes about certification (from an employer point of view)?

 5. What are your comments regarding the educational robustness of Industry Certification



Section 3 (all)

A second reason for this research is to possibly introduce a certification for software development risk assessment of ethics-based risk (explain).

1. What is your opinion of such a risk assessment certification?

Appendix D: Hitchcock, L. (2005). Industry certification: Value, validity; and a place for SoDIS®. *ACM SIGCSE Bulletin*, 37(4), 59-63.

Industry Certification: Value, Validity; and a Place for SoDIS®

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Abstract

Industry certification is a veritable juggernaut driven by several dynamics: candidates seeking to boost knowledge, skills, status, and remuneration; the industry and professional associations seeking to set minimum standards, and raise the bar of competency levels; employers seeking ways to better qualify job candidates; consumers demanding knowledgeable and skilled professionals; and product vendors demanding highly competent technicians implement and support their products. Academic institutions are integrating industry certification in their curricula. A certification for the SoDIS (Software Development Impact Statements) methodology of ethics-based risk assessment has been mooted.

Keywords

Industry certification. IT certification. Professional certification. Risk assessment. Ethics

Background

The initiation phases of a software development project can introduce risks to stakeholders. The SoDIS process inspects project and software requirements for downstream impacts of these risks. Additionally, the integrity of final deliverables is strengthened as the inspection also focuses attention on project process [14]. SoDIS is also used for teaching ethics-based risk assessment [15].

This paper, the first of two, addresses the value and validity of industry certification and its applicability to SoDIS analysts and teachers.

For more than a decade industry certification has been an industry in its own right [see 10], with at least one certification claiming to have a 30 year history [16]. In 1990, IT certification was well established, with Novell the “giant” of certification, and Microsoft about to become so [2]. The Internet was soon to burgeon, and along with it a plethora of certifications. IT certification tests were largely knowledge-based, allowing candidates to pass with little or no on-the-job experience, leading to widespread criticism and the use of the term “paper” certifications. While this criticism was valid in many cases, and unfair in an equal number, the trend has, understandably, been toward more performance-based programmes. Today, the number of certifications is impossible to quantify but estimated in the thousands [20], with many academic institutions integrating IT industry certification into their curricula.

The literature search found no major research into industry certification, and only two survey-based reports, both with not insignificant limitations [6]; [7]. Surprisingly few scholarly articles were found, with most focusing on integration with academic curricula, or the complementary nature of industry-based and academic qualification. Much literature has a strong marketing bias.

Personal stories

John enrolled for a CNE (Certified NetWare Engineer) as his passion was to enter the IT industry. He completed CNA (Certified NetWare Administrator), obtaining himself a job in IT. He quickly completed CNE, securing himself a network engineer position: a “paper” CNE. Within 10 months he repaid the \$NZ10,000 borrowed to complete the programme. Sometime later he had achieved MCSE (Microsoft Certified Systems Engineer) and was working for an hourly rate beyond my imagination (Personal communication, c.1997). Certification had propelled him to places he had probably never imagined he could go.

After many years, Mathias Thurman decided to complete a certification [29]. He had thought that they were a waste of time, reinforced by interviewing job applicants with impressive certifications but little experience. Some, however, did impress, as their certifications were based on hands-on lab tests, and after meeting CISSP (Certified Information Systems Security Professional) holders who impressed him with their knowledge and praise of the programme, decided to take the exam. Thurman considered between two certifications, finally choosing the CISSP based on popularity.

These personal stories (of many) highlight major individual benefits of certification. Conversely, each also illustrates a major criticism.

Advantages, benefits, criticisms

The individual

There can be little doubt that certification levered John into his desired position in IT, along with handsome remuneration. John Au, Business Development Manager for NTT Data Corp, Malaysia, states that certification is the indicator of understanding and knowledge of specific skills, sets a foundation to what professionals should learn to become competent, and indicates that an individual is an expert in the field of the certification [23]. He says it provides career advancement, salary increment, job diversification, marketability, and worldwide recognition of expertise in a certain field.

But while certification does not *guarantee* a job, it can, even without experience can “help get a foot in the door” [Gorley in 2, para.18], giving the holder credibility [Semeraro in 2];[5], as they are equipped with good marketable skills [21]. A certification however, is more than just a catalyst for obtaining that first job - it is the key to career advancement and new employment opportunities [Ash in 1]; [4]; [5]; [12]; [18]; [Au in 23]; [25]. The AAPNZ [3] says it is a “a statement of the skills you take with you from role to role[,] ... gives value to those skills[,] ... recognises that you are a professional at the work you do ... [and] have a certificate to prove it” (para 2), and are benchmarked to the standard required of the profession. Peter Childers of Red Hat says that true performance-based certifications accord a higher value, that the holder receives higher levels of confidence, increased recognition of competence, prestige, leadership, and enhanced promotion opportunities [8].

And certification can attract significantly more compensation [Prencipe in 6]; [Williamson in 6]; [Au in 23]. Swanson [28] reports that payments had increased for certifications but declined for non-certified technicians.

Employers

When hiring, IT managers want to be sure they are “getting their money’s worth” [1, para. 1], and certification may alleviate confusion in assessing which skills an applicant has [2]. Gary Devoe, an IT manager, states that certification is important if one needs their new hire to “hit the ground running” [1, para. 3], and Vanessa Swartz of Oracle, says an unbiased certification test is the best way to make sure one has the right people [1]. Many agree, saying that certification is a verification of knowledge and requisite skills [1]; [7]; [12], [Bean in 22]; [Au in 23]; [24], [25]. Others, however, say that certification has never been important, that employers are looking for more work experience [1], and, especially in the early-mid 1990s, certified professionals often lacked real-world experience [9]. Cocks [9] cites a case of 20 applicants but only four with experience, then only marginal. Richard Koenig [in 11] then head of (ISC)², observes in 1992 that certification benefits include identification of individuals with specific expertise and who meet dictated criteria, as well as applicants who can be assessed based on achievements rather than an ability to write a convincing résumé. Others [in 11] warn against an over-

reliance on certification, including David Stang, Chair of the International Computer Society Association, who says that there is no substitute for experience, that ongoing education should be emphasised. Foster [13] says that experience may not give the answers either as his counted for nothing outside the company he worked for, and that certification was another way of getting educated. Gorley [in 2] says that previously “everybody who ever did a Web page claims to be a Webmaster” (para. 18). Caroline Rose, former Novell Education VP and now CEO of USWeb Learning, says that certification brings clarity, allowing identification and definition of expertise [in 2], and Bob Cullifer, Executive Director of the National Association of Webmasters says that certification defines an occupation and legitimises a title [in 2].

Williamson states that “professional certification is one of the most common tools used by employers to measure the capability of a potential hire” [7, p. 98]. Sagar [in 7] states that certification will “delineate an expert level of knowledge from a non-expert level of knowledge” (p. 99). Cegielski’s [6] research, however, found that while the majority of HR professionals believed that a certified administrator was on average more competent, with the entire group saying that it minimised their responsibility for candidate assessment, and many saying that it attested to the candidates’ skill level, only four (of 27) IT professionals believed that certification correlated to ability, with none indicating that certification was a justification for the hire. Cegielski, Rebman and Reithel’s research [7] also found that certification is not a positive predictor of ability.

While certification is a criterion that employers seek when hiring [7]; [9], and while many employers assume that a certified network professional is better able to manage network resources [7], Cegielski et al’s research [7] found that end-users of networks administered by certified professionals did not have higher perceptions of the network than did end-users of networks administered by non-certified technicians, and that there is no significant difference in either the perceived usefulness or ease-of-use, concluding that employers should develop an aggregate means of assessing capabilities, that certification is **one** criterion and not the sole basis for hiring.

Even given these reservations, Ireland [18] lists benefits including; employees with a consistent understanding of their profession, and using certification as a point of differentiation from competition. Martin Bean, CEO of New Horizons Training, says that during a skill shortage in the later 1990s, certification was one of the ways employers could qualify résumés at the primary level, but today some employers are demanding experience along with knowledge. He lists several ways corporations can measure a return on their certification investment; a decrease in employee turnover, improvement in client retention, an increase in productivity, faster promotion for employees, and reduced hiring costs [22]; [see also 18, 25]. Robertson [25] also lists increased customer service and satisfaction levels, attaining marketing leverage, and a meaningful way to invest in staff by demonstrating their value. Certified staff also lowers risk and exposure to third parties [27]

The consumer

Lenny Lightle, Director of Technology for Imaging Office Systems, says that, increasingly, RFPs are asking for certified team members, as buyers “are assuring themselves that they will be working with knowledgeable professionals” [in 4, para. 4]. Tim Dilley, Senior VP, Informatica, says that the goal of their certification is to “authenticate genuinely expert individuals who can help customers derive optimum value from ... projects” [17, para. 4]. Ireland [18] says that consumers who expect their products and services to be delivered in a consistent manner that meets professional standards will benefit from using certified professionals as they receive greater value through proper design and implementation at a greatly reduced cost. Additionally, certified technicians have access to additional technical support.

The industry and profession

According to Brandt, certification fosters excellence, raising the overall competency level within an industry [5], enhancing its stature, and providing opportunities for growth and professional development [18]. Robertson [25] believes it is a demonstration of professionalism with the industry and is the visible sign of commitment, and that industry stakeholders benefit from an objective, fair, meaningful system of certification and have a right to expect its workers are qualified. A certification system guarantees a supply of qualified professionals [24]. The skills arising strengthens a profession by assuring that certified professionals meet the same minimum standards, otherwise the profession is weakened, bringing into question the legitimacy and ethics of that profession [Hayman; Hale in 24].

The criticisms

Many people with experience say that certification is a waste of time, as did Matthias Thurman [29]. In the main, many of these comments are from individuals with no ambitions of career advancement, who do not envisage being left behind by advancing technologies. In many instances, nevertheless, they are directed to complete a certification by their employer who can see the benefits, as Thurman eventually did.

Certification can be costly. Cisco's CCIE lab-exam costs in excess of \$US1000. There is a cost, too, for ongoing re-certification. One "Gripe Vine" forum contributor [13] cites three reasons for expensive certifications: to ensure that one invests so much they will never recommend any other product; to enable certification vendors to claim large numbers of certified professionals supporting their products; and the money it brings. In the early 1990s, Novell boasted the most certified professionals. Considering the significant trend toward other products the first claim is doubtful. And, certification is not a significant revenue stream, (but may, however, spawn additional revenue streams) [20]. In my opinion, the second claim is a positive affirmation!

Robertson [25] believes that cost is significantly outweighed by benefits. Ireland [18] believes that few people question either the cost and return on investment of certification, or certification as a basis for evaluating competence.

Trends

In 1993 technical certification was "all the rage" [see 9], with the controversy at that time the proliferation of "paper" certifications. In 2001, Joss notes a trend towards performance-based certifications, a trend likely to become a standard as many training programmes taught candidates how to pass the tests, not how to perform in the real world [19]. While many instructors *teach* for the real world, the focus of many candidates was indeed on passing the test. Dr. Amir Elanhi, President of Computer Analytics Inc, observes that "something is broken ... when the individual feels compelled to cram for the exam rather than learn actual skills" [in 19, para. 18]. "As the IT world matures", Joss says, "we're realizing that knowledge does not necessarily equal capability" [19, para. 4]. Knowledge-based examinations measure a candidate's understanding of vocabulary, a body of knowledge, and some practices, whereas performance-based certification, which may include a sample of a candidate's experience, infers an ability to perform tasks at a given level, giving a greater degree of assurance and value [18].

There are numerous examples of tertiary and secondary academic institutions integrating industry certification into their curricula. One example is Wellington Institute of Technology, New Zealand (formerly CIT), who have been offering industry certification, including testing, for more than a decade, and will cross-credit towards their own qualifications. While academic degrees can set a path for a career they are insufficient to furnish specific product skills [Au in 23], and industry certification adds that competence [10]. Novell, IBM (formerly Lotus), Microsoft, and other providers, base their training materials, content, and instructor requirements on similar pedagogy and didactical requirement as present in academic institutions. Additionally, Novell, as one example of a professional community, maintains an extensive certified professional community discussion base and holds regular symposia. Feedback from their certified community helps build, improve and develop their training and certification programmes, as well as being a communication link between consumers and Novell.

Conclusion – is there a place for SoDIS certification?

There can be no doubting the popularity, value, or validity of industry-based certification as a credential.

In my view the experience vs. "paper" certifications debate is flawed. An individual gains experience by working on real tasks. But to gain experience in the first instance one needs a qualification that indicates competent knowledge, attitude, and some skill. A so called "paper" certification therefore is a valid qualification, just as a University qualification is for the new graduate - a qualification to work on a given task and achieve the next level of credential; experience. John certainly proved this, as have many others.

The criticism that a certification has no value once an individual does gain experience is similarly flawed. There are many cases where so called "experience" is incompetently delivered as knowledge is lacking,

or bad practices have been learned. A certification validates knowledge and competency in practice thereby validating the experiential content. Matthias Thurman came to believe this, as do many employers.

Industry certification has become integrated with many academic curricula. It is complementary to academic qualifications, giving the individual a more complete and diverse parcel of credentials with which to both enter the job market and to perform professionally and expertly in their chosen field of endeavour.

While acknowledging that the ACM views the integration of industry certification with academic curricula as problematic [26], I, nevertheless, posit that there is a place for a SoDIS-based certification. A certification that will build a professional community, develop a discussion base and a knowledge base, as well as contribute and participate in strengthening the ethics-based risk assessment profession, the teaching of ethics-based risk assessment, and the credential itself.

I will posit further views in my following paper.

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Appendix E: Hitchcock, L. (2006). *Methodology in computing education: a focus on experiences*. Paper presented at the 19th Annual NACCQ Conference, 7-10 July, Wellington New Zealand.

Methodology in computing education research: a focus on experiences

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Abstract

Over the past several decades, particularly since it was adopted by the IT industry in the 1980s, industry certification has expanded into a multi-billion dollar business (Cosgrove, 2004). But is it a pedagogically robust form of credentialing? Does it have value to those who hold such certifications and to the industry they represent? A current study using both phenomenography and Interpretive Phenomenological Analysis (IPA) suggests that, if well designed and well administered, such certifications are indeed pedagogically sound, with significant value. It is therefore argued that such a credentialing system can be used for teachers and analysts of SoDIS (Software Development Impact Statements).

Keywords: Computing education, industry certification, professional certification, interpretive phenomenology, IPA, phenomenography, SoDIS.

Introduction

In this paper I outline the methodology used in a study of the value and pedagogical robustness of industry certification, and the applicability of such a certification to teachers and analysts of SoDIS[®] (Software Development Impact Statements). The methodology focuses on the *experiences* of actors within the phenomenon that is industry certification. First, *phenomenography* focuses on the essence of actors' understanding and meaning constructions of industry certification. Second, as a joint methodology, *Interpretive Phenomenological Analysis (IPA)* with a focus on the essence of the phenomenon of industry certification itself. At the time of writing a comprehensive literature review has been completed, coded, and written up. While empirical data is yet to be collected from interviews with a small sample of certification holders and employers of certification holders for triangulation purposes, enough data has been collected in the literature review to present some preliminary and relatively robust findings.

In this paper I will outline the research methodology adopted, the methods of data collection and methods of analysis, along with some preliminary findings.

Industry Certification

Certification sponsored by industry (industry certification) has been a form of credentialing for decades. In 1938, due to a need for a common approach to testing, the Association of Short-circuit Testing Authorities (ASTA) was formed, along with ASTA Certification Services, with the support of the then UK Government Department of Scientific and Industrial Research (ASTA BEAB, 2004). The Institute of Certified Professional Managers (ICPM) Certified Manager claims a 30 year history ("ICPM offers manager credential", 2005). Novell, Inc. began testing and certifying IT industry and IT network professionals in 1986 (Cosgrove, 2004; Novell, 1996). Global certification testing centres were established in 1990 by Drake International (now Thomson Prometric) (Foster, 1997). Novell claimed their one-millionth certification in 1995 (Novell, 1996).

This quality assured paper appeared at the 19th Annual Conference of the National Advisory Committee on Computing Qualifications (NACCQ 2006), Wellington, New Zealand. Samuel Mann and Noel Bridgeman (Eds). Reproduction for academic, not-for profit purposes permitted provided this text is included. www.naccq.ac.nz

Industry certification has become a veritable juggernaut (Hitchcock, 2005), a “multi-billion dollar business” (Cosgrove, 2004, p. 486), with the number of available certifications impossible to quantify (Knapp & Gallery, 2003). The dynamics that drive it derive from a diverse range of stakeholder groups (Hitchcock, 2005):

- a) certification candidates seeking to enhance their knowledge and skills and attain higher status and remuneration
- b) the certified professional community who seek to raise the bar of their universal competency levels and forming a communications link between vendors and consumers
- c) industry seeking to raise the overall knowledge and skill levels within itself
- d) employers who seek ways to better qualify job candidates’ credentials
- e) consumers who demand knowledgeable and skilled professionals
- f) product vendors who demand highly competent technicians implement and support their products
- g) professional associations setting minimum standards and advancing their profession.

Additionally, many academic institutions are integrating industry certification in their curricula.

As a means of credentialing teachers and analysts of SoDIS, a SoDIS industry certification was mooted at the December 2004 SoDIS symposium held in Auckland. SoDIS is a process of assessment of ethics-based risk. A software development project includes three major phases in its initiation stage: feasibility analysis, formulation of functional requirements, and detailing project tasks. Each of these phases can introduce inherent risks to stakeholders. The purpose of the SoDIS inspection process is to identify the possible impacts to stakeholders of the risks within each of these phases. Project and software requirements are inspected for downstream impacts related to, for example, unfair discrimination of, the possible cause of harm to, and professional compromise to stakeholders and stakeholder groups, including the public (Gotterbarn, Clear, & Kwan, 2004).

In order for an industry certification to be a valid and valuable credential for SoDIS analysts and teachers, and likewise for any professional discipline, such a credentialing system must in itself be robust, reliable, and pedagogically sound. The resulting certification will then have value to its holders, as well as to the profession and its end users. Defining the ideal certification model, then, was the basis for the research.

The research methodology

The research examines both individual conceptions of industry certification and the phenomenon of industry certification itself based on the experiences and views recorded in literature of actors within the phenomenon. The research will be further informed by data from interviews with a purposive sample of certification holders and employers of certification holders, and from my own 10 years experience in industry certification.

This means that a *first-perspective* study of the phenomenon itself through experiences of the event, as well as a *second-perspective* study of the understandings of the phenomenon constructed through experiences within it (Marton, 1981) is being undertaken.

The methodology is within the interpretive paradigm. The interpretive world asserts that reality, and our knowledge of reality, are social products (Orlikowski & Baraoudi, 1991). The world is conceived as an emerging social process as an extension of subjective experience, and explanation of meaning is sought within the frame of reference of the actor rather than of the observer (Burrell & Morgan, 1979). The interpretive perspective attempts to “understand the intersubjective meanings embedded in social life ... and hence to explain why people act the way they do” (Gibbons, cited in Orlikowski & Baraoudi, 1991, p. 13). This research aims to interpret the social construction that is the phenomenon of industry certification.

Boghossian (2001) argues that a phenomenon is socially constructed if it is contingent on our social selves, that is it would not exist had we not built it, that it serves a social purpose, and we can freely reject it. Furthermore, Boghossian (2001) argues, we impose structure on it by social-construction talk. Industry certification would not exist had it not been conceived and built by social beings; it serves a social purpose - a credential for those actors who play a part; and can be freely rejected, by those who do play a part, including those who conceived of it and built it, and by those who choose not to play a part.

Text-based research

Due to the vast amount of literature found describing industry actors’ perceptions of and experiences within the phenomenon, the research is predominantly literature-based. Valdes (1987) posits that there is no “interpretation of text that is so certain that no reasonable person would question it” (p. 57). He argues that the meaning of a text is derived from its make-up, which is; its form, its history, the reading experience, and the interpreter’s self-reflection” (p. 60). Furthermore, he argues, a literary work

“transcends the psychological and sociological conditions of its production and thereby comes into a new relationship that cannot be circumscribed” (p. 61).

According to Lee (1994), the meaning of text refers to what the author had in mind, but is not restricted to this. Ricoeur (1981) refers to a text’s reference to a surrounding world, and to what is already socially constructed: what the socially constructed world is that stands behind the author’s written words. Lee (1994) argues that the reader, upon grasping this socially constructed world standing behind the author’s meaning, is not therefore independent but becomes an agent of that world and able to identify inconsistencies, and be able to transcend the author’s own understanding.

Joint methodology

The first-perspective study as mentioned above requires Interpretive Phenomenological Analysis (IPA), since the focus of interest is the conscious intuitive individual experiences and personal perceptions of industry certification. IPA examines the essence of what is experienced, and extracts the *essential features of the phenomenon itself* (Smith, D., 2003; Smith, J., 1996). IPA recognises that different people perceive phenomena in very different ways depending on their circumstances (Smith & Osborn, 2004). This aspect of the research extracts individuals’ viewpoints and how they make sense of industry certification by interpretation of accounts of experiences in order to understand the phenomenon itself, that is, industry certification.

IPA was developed in the 1990s by Dr Jonathan Smith who says that IPA recognises that it is a “process of interpretation by the researcher” (Smith, n.d., para. 1). Used extensively in health research, IPA examines the *experiences* of the patient in order to understand the condition (the phenomenon), and to draw on the researcher’s own experience and conceptions.

For the second-order perspective, phenomenography is required, as the focus is the variation in ways that actors experience the phenomenon of industry certification and their resulting belief construction (Booth, 1997; Marton, 1986). Phenomenography extracts the *essence of the way industry certification is understood*.

Phenomenography appeared in publications in the early 1980s (Marton, 1981; 1986) as an approach to educational research that emerged from an empirical rather than theoretical or philosophical basis (Åkerlind, 2005). Phenomenography allows the researcher to focus on the variation in the ways the actors experience a phenomenon, knowing about it, having skills related to it, and the variations therein (Åkerlind, 2005; Booth, 2001). Its outcomes are the qualitatively different ways of experiencing a phenomenon, or meanings derived there from (Åkerlind, 2005).

Context of the Researcher

While phenomenology normally requires the researcher to stand aside from the data (Marton, 1986), IPA accepts that “each researcher brings particular concepts to the process of analysis” (Smith, Jarman, and Osborn, 1999, p. 554). Chapman and Smith (2002) state that “IPA recognises that the researcher’s own conceptions are required in order to make sense of ... [that] studied” (p. 126).

Phenomenography also allows the researcher to use their own experiences as data for phenomenographic analysis (Berglund, 2005; Säljö 1996; Uljens, 1996). According to Berglund (2005),

the researcher himself (sic) – his beliefs, interests, previous experience, network of discussions, even personality, - is essential for the outcome of a project and become, to a certain degree, part of the results (p. 35).

The outcome of phenomenographic research, Berglund argues, is the researcher’s interpretation of the actors’ understanding, shaped by both the researched and the researcher (see also Säljö, 1996).

Methods of data collection

As stated earlier, the research is predominantly literature based. Interpretive text analysis methods assume that the meaning of text is subjective as the writer's expressions reflect their epoch and circumstances (Lacity & Janson, 2001). As the researcher, therefore, I have taken care to learn more about the writer of each text, taking into account the writer's situation.

Data will also be collected from interviews with a small, purposive sample. The research is further informed by my own life-world experiences within the domain which is the focus of the research.

Methods of data analysis

Phenomenography sorts the understandings of actors into specific categories of description which emerge from an analysis of the data collected (Åkerlind, 2005; Marton, 1981; 1986; Uljens, 1996). These categories (and the underlying structure) become the phenomenographic essence of the phenomenon (Uljens, 1996). They are, Marton (1986) contends, the primary outcomes, and the most important result, of phenomenographic research.

Phenomenographic categories are logically related to one another, typically by way of hierarchically inclusive relationships (Marton & Booth, 1997, cited in Åkerlind, 2005). The process, Åkerlind (2005) points out,

is strongly iterative and comparative ... involving the continual sorting and resorting of data plus ongoing comparisons between data and the developing categories of description, as well as between the categories themselves (p. 324).

IPA adopts a similar method of data analysis by grouping into broad interpretive categories which are then broken down into more specific themes (Reynolds, 2003; Macleod, Crauford, & Booth, 2002). This research identifies hierarchical categories that describe ways of thinking about the phenomenon of industry certification.

Åkerlind (2005) addresses the issue of validity, saying that qualitative researchers “are still traditionally expected to address issues of ... validity and reliability ...” (p. 329). Validity in phenomenographic research asks how well the research outcomes correspond to human experience of the phenomenon rather than how well the outcomes correspond to the phenomenon as it exists in reality (Åkerlind, 2005; Uljens, 1996). IPA of the phenomenon itself, therefore, strengthens the validity of the phenomenography aspect of this research, as well as the overall research itself.

Åkerlind (2005) also addresses the issue of reliability, pointing out that seeking like interpretations from multiple interviewees is not appropriate for phenomenography research as interpretations are made on the collective, not on an individual, basis. IPA, I contend therefore, is likewise, as IPA similarly draws on the actors’ experiences and personal perceptions.

A feature of phenomenographical data analysis methods is variance in practice, which includes variance in data sorting methods (Åkerlind, 2005). One typical method described by Åkerlind (2005) (and referred to above) is the sorting and re-sorting of interview transcripts into piles representing emerging categories of meaning. This data sorting method is likewise advocated by Berglund (2006). The data collected from the literature review derives from interpretations of actors’ experiences and perceptions of industry certification as recorded in texts. As I deemed it unworkable to physically cut up and sort these recorded experiences into such piles, a different data sorting method was adopted. Multiple readings of literature pieces were carried out to allow the categories of meaning to emerge and form a mental picture. The essence of what the literature contained was then written up as an annotated literature review. Open coding was then used to identify the broad categories. Lower-level categories (or themes) were then identified within each category using axial coding, and any further sub-themes were identified using selective coding for a more detailed analysis (Flick, 1998; Strauss & Corbin, 1990).

Hierarchy of categories and preliminary findings

Four broad categories of meaning emerged. These broad categories are:

- 1 Market and product conceptions (of the industry actors)
- 2 Programme models and assessment
- 3 Programme implementation and administration issues
- 4 Professionalism and recognition

Hierarchical sub-categories, or themes emerged from within each of these broad categories as follows:



Fig 1. Categories hierarchy top level

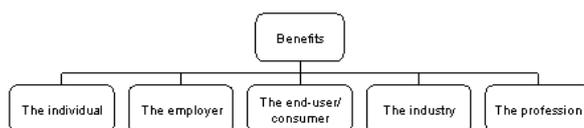


Fig 1.1. Categories hierarchy second level



Fig 1.1a Categories hierarchy lower level

It is not possible to illustrate the complete construction of the categories of meaning hierarchy here. These examples serve to illustrate, however, the hierarchical and relational nature of the categories of meaning. One can see that a more detailed analysis of the lowest level of category illustrated (Fig 1.1a) will provide rich data to assess the value to the individual of industry certification.

A further finding required by the research is the pedagogical validity of an industry certification. The following model, developed from within this study and stemming from the data within broad category 2, programme models and assessment, represents typical and non-typical elements of a certification programme:

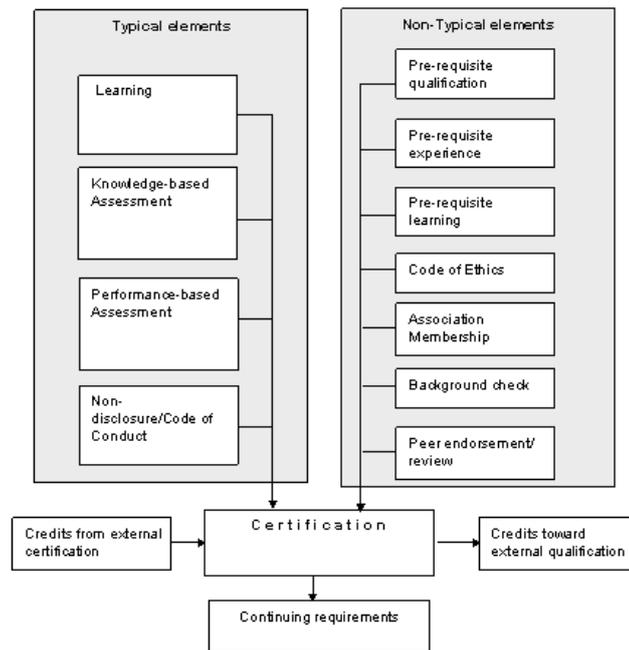


Fig 2. Typical and non-typical elements of a certification programme.

As mentioned earlier, at the time of writing, empirical data has yet to be collected from interviews. While the analysed data from the literature survey has not therefore been triangulated with the data that these interviews will generate, the data gathered from broad literature sources provides a rich, robust, in-depth picture of the industry that is industry certification. The findings are extensive and unable to be presented in their entirety here and have therefore been significantly condensed into this simple model. I contend, however, that one can glean from this model that the presence of all of the typical elements shown here, and with relevant non-typical elements included, that the given certification programme is rigorous and robust, and fits an accepted model of pedagogical validity.

Given that the associated assessment and administrative processes have rigorous, transparent elements of integrity and security, and these processes are robust, using this model a certification candidate or stakeholder may assess the certification for value and pedagogical validity. Fig 3. (following page) illustrates how the presence of rigour and robustness of the certification programme, performance-based elements, relevant non-typical programme elements, and integrity and security of assessment, compound to increase the value and pedagogical soundness of the certification. Additionally, the more rigorous the learning content, the greater the value and pedagogical validity.

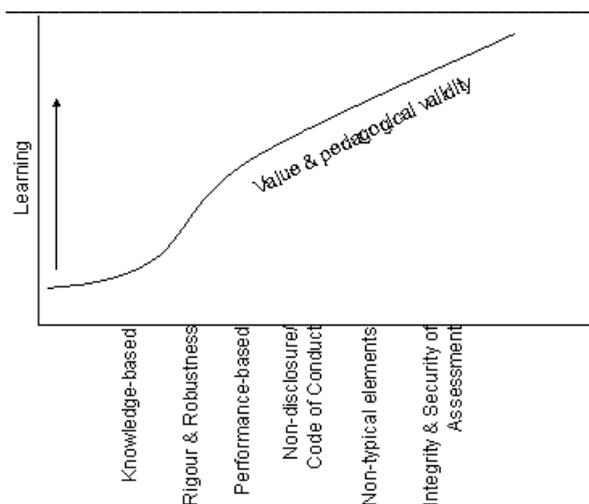


Fig 3. Scale of certification value and pedagogical validity

Conclusion

A joint methodologies approach has been adopted, first, to understand the phenomenon of industry certification *itself* in order to design and develop a programme with pedagogical and industry validity, integrity, and robustness. Second, to understand how participants *experience* industry certification in order to adopt a programme that appeals to and has value for those prospective candidates for a SoDIS certification. As the researcher, I believe this joint approach is valid for the robustness of the research results. While both IPA and phenomenology normally carry out themed analysis on a small sample, I believe this research makes a reasoned variance. As this research is largely based on secondary-source material, from broad literature sources and rich in data, it is my conviction that higher levels of rigour have been attained from the multiplicity of experiences contained in the material than would be the case from close interviews with a small sample. Even so, data from a small purposive sample will further triangulate the research.

A further reasoned variance from prescribed methods of data sorting has been adopted by using coding to identify categories of meaning. According to Åkerlind (2005) however, *variance in methods* is a *feature* of phenomenography. As IPA similarly adopts the identification of categories of meaning, the variance in methods within this research is considered justified.

This research does not attempt to claim that *all* industry certifications have value and are pedagogically robust, however the preliminary results provide the basis of a model to identify the elements of such a certification. The SoDIS SEPIA collaborative partnership group (Clear, McHaney, & Gotterbarn, 2004), therefore, will be able to design and introduce such a certification.

The comprehensive findings will be the subject of further papers once interview data has been collected and analysed.

Acknowledgements

I wish to thank Dr Richard Smith, AUT University School of Education, and Tony Clear, AUT University School of Computer and Information Sciences, for providing many relevant references and pointing me in some useful directions. Thanks also to Anders Berglund, Uppsala University, Sweden, for providing insights into phenomenography.

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Appendix F: Researching Industry Certification: Is it appropriate as a form of credentialing for the SoDIS®?

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Introduction

In December 2004, at the SoDIS® (Software Development Impact Statements) symposium in Auckland, an industry certification as a method of credentialing the SoDIS teachers and analysis was mooted. The SoDIS, a process of ethics-based risk assessment and analysis of downstream risk to project and software stakeholders, including the public, is currently in the process of progressing from prototype to commercial product. Certification was proposed to ensure the integrity of the process and the quality of service to stakeholders.

Much of the following has been excerpted from a quality assured paper that appeared at the *19th Annual Conference of the National Advisory Committee on Computing Qualifications* (NACCQ 2006), Wellington, New Zealand. Samuel Mann and Noel Bridgeman (Eds). Reproduction for academic, not-for profit purposes permitted provided this text is included (www.naccq.ac.nz).

As outlined in Hitchcock (2005, 2006), certification sponsored by industry, commercial organisation, or professional association or foundation (collectively referred to here as industry certification) has been a form of credentialing for decades. In 1938, the Association of Short-circuit Testing Authorities (ASTA) introduced the ASTA certification with the support of the then UK Government Department of Scientific and Industrial Research (ASTA BEAB, 2004). The Institute of Certified Professional Managers (ICPM) Certified Manager claims a 30 year history ("ICPM offers manager credential", 2005). Novell, Inc. began testing and certifying IT industry and IT network professionals in 1986 (Cosgrove, 2004; Novell, 1996). Global certification testing centres were established in 1990 by Drake International (now Thomson Prometric) (Foster, 1997). Novell claimed their one-millionth certification in 1995 (Novell, 1996).

Especially since its adoption by the IT industry over the decade following 1986, industry certification has become a veritable juggernaut (Hitchcock, 2005): a "multi-billion dollar business" (Cosgrove, 2004, p. 486), with the number of available certifications impossible to quantify (Knapp & Gallery, 2003). The dynamics that drive it derive from a diverse range of stakeholder groups (Hitchcock, 2005, 2006): certification candidates seeking to enhance their knowledge and skills and attain higher status and remuneration; the certified professional community who seek to raise the bar of their universal competency levels and forming a communications link between vendors and consumers; industry seeking to raise the overall knowledge and skill levels within itself; employers who seek ways to better qualify job candidates'

credentials; consumers who demand knowledgeable and skilled professionals; product vendors who demand highly competent technicians implement and support their products; and professional associations setting minimum standards and advancing their profession.

Many academic institutions both at tertiary and secondary level are integrating industry certification, especially ICT certification, into their curricula (Hitchcock, 2005, 2006).

Discussion

Is industry certification, however, a pedagogically robust form of credentialing? Does it have value to its stakeholders? Is it an appropriate form of credentialing for the SoDIS? This research, using both Phenomenography and Interpretive Phenomenological Analysis (IPA) as a joint methodology, focuses on the *experiences* of actors within the phenomenon of industry certification. It extracts and examines both the essence of the understanding and perceptions of the value and validity of industry certification, *and* the essence of industry certification itself (Hitchcock, 2006). The research data was gathered from an extensive literature review, interviews with a small sample of certification holders and employers of certification holders, and from the researcher's own ten years experience in the IT certification domain. While this is still a Work In Progress, some preliminary findings, however, are presented below. A broader, more in-depth report will be written up once the thesis is complete.

The research identifies both benefit and criticism elements of common certifications. Benefits that constantly appear in literature articles, and corroborated by the interviews include;

1. career advancement and the associated remuneration benefits;
2. establishing the holder's credentials and credibility;
3. establishing the holder's level of knowledge leading to acceptance and respect by peers;
4. "value add" benefits including; access to software, knowledge bases, and escalation; magazine subscriptions; invitations to conventions; use of logos, etc.

Benefits accrue too for employers as one important criterion for assessing job candidates, and establishing the level of expectation of on-the-job ability.

Criticisms elements include;

1. the devaluing of the value of the certification if it becomes too easy to attain;
2. a certification is a waste of time if one already has the experience;
3. the certification provider benefits more than the certification holder;
4. cost, especially of maintaining the certification as current;
5. the life span of some certifications is quite short.

The first of these criticisms was accepted as true by the interview subjects. Criticism two was strongly refuted. Criticisms three and four, while somewhat accepted, were regarded as being irrelevant. The final criticism was raised by the interview subjects and not mentioned in the literature.

Elements of the various certification programmes can be categorised into typical, and, arguably, more rigorous, less typical elements. Typical elements include; a training content; knowledge-based assessment; performance-based assessment; and non-disclosure agreement (disclosure of assessment content) and/or a code of conduct. Less typical elements include one or several of; the requirement for a prerequisite qualification and/or prerequisite experience; prerequisite learning; compliance to a code of ethics; membership of an association; a background check; and peer endorsement.

The research suggests that the more respected certifications in terms of stakeholder value and pedagogical robustness contain all of the typical elements *plus* some or many of the less typical elements. This is especially the case in regards to the level of practical assessment or required practical experience content. The rigour and robustness of the programme itself, and the rigour, integrity and security of the assessment programme further adds to the value and pedagogical robustness of a given certification.

Conclusion & Recommendations

While this research does not attempt to single out specific industry certifications to determine their value or pedagogical robustness, the findings suggest that, in general, well designed and well administered certifications with integrity and rigour of assessment processes, are indeed pedagogically sound, with significant value (Hitchcock, 2006).

Preliminary conclusions are reported here as presented at the SoDIS symposium held in Wellington, 7th July 2006: It is concluded from the research, that such an industry certification is indeed appropriate for teachers and analysts of SoDIS. Comments from the interview sample included;

- “Probably the best way”
- “Gives grounding and validity”
- “Very appropriate”
- “Gives a responsibility stakeholding

The certification paradigm recommended is vendor-neutral, *professional* certification. The introductory SoDIS certification as currently proposed by the SDRF (Software Development Research Foundation), compares favourable with the more rigorous,

“less typical” certification model as described here. It contains elements of experience in software project management, prerequisite training in the SoDIS process, with a practicum emphasis as well as the cognitive.

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Appendix G: Proposal paper to the EARLI SIG9 Workshop, Hong Kong, December 7-9, 2007

Phenomenography and Interpretive Phenomenological Analysis: Researching understanding of a phenomenon and the phenomenon itself through actors' experiences.

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Presentation Summary

Certification sponsored by industry has been a form of credentialing for decades. It has become a veritable juggernaut (Hitchcock, 2005), a multi-billion dollar business (Cosgrove, 2004), with the number of certifications impossible to quantify (Knapp & Gallery, 2003). It is being integrated into academic curricula at secondary and tertiary level. But is it a pedagogically robust form of credentialing? Does an industry certification have value to its stakeholders: those who hold such certifications, the industry the certification represents, and consumers in that space?

This presentation outlines the methodology used in Masters-level research into industry certification, focusing on the *experiences* of actors within the phenomenon that is industry certification. *Phenomenography* focuses on the essence of understanding and meaning constructions (Booth, 1997; Marton, 1986) of industry certification. And, as a joint methodology, *IPA (Interpretive Phenomenological Analysis)* focuses on the essence of the phenomenon itself through actors' experiences (Smith, 1996).

Phenomenography's focus is the variation in experiences of industry certification, extracting the *essence of the way industry certification is understood*. IPA focuses on the essence of what is experienced, extracting the *essential features of the industry certification itself*.

Phenomenography allows the researcher to use their own experiences as data for phenomenographic analysis (Berglund, 2005; Uljens, 1996). Similarly, IPA accepts that "each researcher brings particular concepts to the process of analysis" (Smith, Jarman, and Osborn, 1999, p. 554). The researcher's 10 years experience in industry certification was used to inform the research.

Due to the vast amount of literature describing industry actors' perceptions of and experiences within the phenomenon, the research is predominantly literature-based. Empirical data was collected from interviews with a small sample of certification holders and employers of certification holders for triangulation purposes, and to further inform the research.

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Specific categories of description emerged which became the phenomenographic essence of industry certification (Uljen, 1996). IPA adopts a similar method by grouping data into broad interpretive categories which are then broken down into more specific themes (Reynolds, 2003).

Phenomenography research interpretations are made on the collective, not on an individual, viewpoint (Åkerlind, 2005). IPA seeks a convergence and divergence of themes (Smith, 2004), which, I contend, reflects Phenomenography's collective viewpoint. IPA, in contrast, also places importance on individual viewpoints (Reynolds, 2003). The data analysis, in addition to presenting a collective viewpoint, also emphasises relevant individual viewpoints.

Phenomenographical methods include variation in data sorting (Åkerlind, 2005). Typical is the sorting and re-sorting of interview transcripts into piles representing emerging categories of meaning (Åkerlind, 2005; Berglund, 2006). As it was unworkable to physically cut up and sort literature-based experiences into such piles, a different method was therefore adopted. Multiple readings of literature pieces allowed categories of meaning to emerge and form a mental picture. The essence of what the literature contained was then written up as an annotated literature review. Open coding identified broad categories, axial coding identified sub-categories (or themes), and selective coding identified lowest-level sub-themes for a more detailed analysis (Flick, 1998; Strauss & Corbin, 1990). In order to retain a consistent data sorting method, this was also adopted for the interview data.

Sub-categories and lowest-level themes that emerged from within each of the broad categories were constructed into an interrelated categories of meaning hierarchy that will be described in the presentation. A pedagogical robustness model, developed from within this study will similarly be outlined.

Abstract

Over the past several decades industry certification has expanded into a multi-billion dollar business (Cosgrove, 2004), with the number of certifications impossible to quantify (Knapp & Gallery, 2003). Industry certification is being integrated into academic curricula at secondary and tertiary level. But is it a pedagogically robust form of credentialing? Does it have value to those who hold such certifications, and to the industry and consumers they represent? New research using a joint methodology, Phenomenography and Interpretive Phenomenological Analysis (IPA), suggests that certifications that are well designed, have elements of performance-based assessment and/or experiential content, and are well administered, are indeed pedagogically sound, with significant value.

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