

Safeguarding Australians:

Mapping the strengths and challenges toward sustainable improvements in OHS education and practice

Final Report Part 1
2009

Project team members:

Yvonne Toft, Central Queensland University

Mike Capra, University of Queensland

Ryan Kift, Central Queensland University

Deborah Moodie-Bain, University of Western Sydney

Pam Pryor, Safety Institute of Australia and University of Ballarat

Ian Eddington, University of Southern Queensland

Darren Joubert, Central Queensland University



Support for this project has been provided by the Australian Learning and Teaching Council, an initiative of the Australian Government Department of Education, Employment and Workplace Relations. The views expressed in this report do not necessarily reflect the views of the Australian Learning and Teaching Council Ltd.

This work is published under the terms of the Creative Commons Attribution-Noncommercial-Share Alike 2.5 Australia Licence. Under this Licence you are free to copy, distribute, display and perform the work and to make derivative works.

Attribution: *You must attribute the work to the original authors and include the following statement: Support for the original work was provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.*

Noncommercial: *You may not use this work for commercial purposes.*

Share Alike: *If you alter, transform, or build on this work, you may distribute the resulting work only under a licence identical to this one.*

For any reuse or distribution, you must make clear to others the licence terms of this work.

Any of these conditions can be waived if you get permission from the copyright holder.

To view a copy of this licence, visit

<http://creativecommons.org/licences/by/2.5/au/> or send a letter to Creative Commons, 543 Howard Street, 5th Floor, San Francisco, California 94105, USA.

Requests and inquiries concerning these rights should be addressed to the Australian Learning and Teaching Council, PO Box 2375, Strawberry Hills NSW 2012 or through the website: <http://www.altc.edu.au>

2009

This report will be electronically available via the Safety Institute of Australia website at <http://www.sia.org.au/research/projects> as the primary repository.

EXECUTIVE SUMMARY

The broad aim of *Safeguarding Australians* was to facilitate alignment of Occupational Health and Safety (OHS) education with evolving workforce requirements. With a focus on education of the generalist OHS professional, the project was informed by current issues in OHS education, including:

- lack of an agreed core body of knowledge for OHS;
- lack of clarity regarding the required level of education for an OHS professional;
- appropriateness of current teaching strategies for equipping OHS professionals for operation in a changing business environment;
- appropriateness of external modes of delivery of OHS programs;
- availability of suitably qualified OHS educators; and
- preparation of OHS professionals to be lifelong learners.

Literature relevant to education of the generalist OHS professional was reviewed with thematic attention on integrity of the profession, student learning and the OHS 'academy.'

The investigation strategy was geared to facilitating extensive consultation with OHS professional, regulator, educator, registered training organisation and graduate stakeholders. Action research methodology allowed a cyclic multi-phase process of data collection and analysis, with ongoing refinement of survey instruments. Various combinations of stakeholder groups were included in focus group discussions, surveys, telephone interviews and a workshop.

Mapping the content and delivery of OHS education at Australian universities involved exploring the disciplinary underpinning of current programs, and eliciting stakeholder expectations of the learning outcomes and underpinning curricula required for generalist OHS professional competency. Further insight resulted from identification of strengths, challenges and gaps in the delivery of OHS education as perceived by stakeholders. Three key requirements for delivery of required OHS graduate outcomes were identified: 1) undergraduate tertiary education has to be recognised as the entry-level qualification for generalist OHS professionals; 2) OHS undergraduate education programs need a multidisciplinary base; and 3) a work-integrated learning model of education needs to underpin the curriculum design process. Assessment of the sustainability of the academy of OHS educators highlighted ominous negative influences. In an ALTC OHS Educators' Workshop, analysed data were presented for discussion and validation by stakeholders. At this workshop, Wenger's (1998) notion of a 'community of practice' provided a fruitful perspective for discussing how OHS educators might engage for their own professional development and to strengthen OHS professional education. Empowered to take ownership of project outcomes, workshop participants established the Academy of OHS Education and Research, a significant project outcome with potential for massive positive impact on the future of OHS education in Australia.

CONTENTS

	Page
1. INTRODUCTION	1
1.1 Research context	1
1.2 Project scope	4
1.3 Report structure	5
2. LITERATURE REVIEW	6
2.1 Integrity of the OHS profession	6
2.1.1 Evolution of the OHS professional	6
2.1.2 Lack of clarity of role and disciplinary underpinning	8
2.1.3 Lack of an agreed core body of knowledge	9
2.1.4 Lack of clarity on required educational level	13
2.1.5 Lack of course accreditation	15
2.2 Student learning in OHS	15
2.2.1 Requirements for effective learning	16
2.2.2 Teaching and learning strategies	19
<i>Problem-based learning</i>	19
<i>Project-based learning</i>	22
<i>Team-based learning</i>	24
2.2.3 Mode of delivery	27
2.2.4 Assessment	31
2.2.5 Learners in OHS professional education	35
2.3 The OHS 'academy'	36
2.4 Summary	38
3. METHODOLOGY	42
3.1 Investigation strategy	42
3.2 Key stakeholder groups	43
3.3 Data collection	44
3.3.1 Focus groups	45
3.3.2 Questionnaires	46
3.3.3 Interviews	49
3.3.4 Workshop	49
3.4 Data analysis	50
3.5 Summary	50
4. CONTENT AND DELIVERY OF OHS TERTIARY EDUCATION	51
4.1 Disciplinary underpinning	51
4.1.2 Subject areas	53

4.2 Stakeholder expectations about learning outcomes and underpinning curricula	56
4.2.1 Generalist OHS professional competency	56
4.2.2 Curriculum content	60
4.2.3 Minimum education level	65
4.2.4 Type of learning	67
4.2.5 Delivery and assessment	68
4.3 Summary	70
5. STRENGTHS, CHALLENGES AND GAPS IN THE DELIVERY OF OHS EDUCATION	72
5.1 The challenging nature of OHS education	72
5.2 Strengths	73
5.3 Challenges	75
5.4 Gaps	78
5.5 Summary	78
6. SUSTAINABILITY OF THE ACADEMY	80
6.1 Numbers of OHS tertiary educators	80
6.2 Age profile	81
6.3 Qualifications and experience	81
6.4 Recruitment and retention	83
6.5 Succession planning	84
6.6 Summary	85
7. A COMMUNITY OF PRACTICE OF OHS EDUCATORS	86
7.1 What is a 'community of practice' (CoP)?	86
7.2 Does an OHS CoP exist?	86
7.2.1 Background	86
7.2.2 The situation today	87
7.3 Is there a requirement for an OHS CoP?	89
7.4 Creating and sustaining a CoP of professional OHS educators	91
7.5 What CoP outcomes are envisaged?	92
7.6 Summary	92
8. CONCLUSION	98
8.1 Limitations	98
8.2 Outcomes	100
8.2.1 Guidelines for the future sustainable development of university education for generalist OHS professionals	103
REFERENCES	106
APPENDICES	113

LIST OF TABLES

	Page
Table 2.1: Hoyle's professional orientation attributes for teachers	12
Table 2.2: Factors that may impact on the effectiveness of problem-based learning (PBL)	21
Table 2.3: Requirements for effective e-learning	30
Table 2.4: Learners' perceptions of efficacy of assessment methods (adapted from Le & Tam, 2007)	32
Table 3.1: Participants involved in each data collection activity	45
Table 3.2: Number of participants at each focus group	46
Table 3.3: Survey response rates for OHS stakeholder groups	47
Table 3.4: Survey participant demographics	48
Table 4.1: Required knowledge base for a generalist OHS professional	51
Table 4.2: Subject areas covered in Australian undergraduate and postgraduate OHS programs	54
Table 4.3: Expectations of what a competent OHS professional should be able to do	57
Table 4.4: Skills and knowledge attributes required by a competent generalist OHS professional	59
Table 4.5: OHS content areas that should be covered in undergraduate and postgraduate programs	62
Table 4.6: Skills and knowledge attributes that need to be acquired from OHS education	64
Table 4.7: Minimum educational level for an entry-level OHS professional	66
Table 4.8: Knowledge learning versus experiential learning	67
Table 4.9: Current delivery/learning styles used by educators	69
Table 4.10: Value of different delivery/learning methods as rated by graduates	69
Table 5.1 Satisfaction with the way OHS practitioners are being educated	74
Table 5.2 Reasons why professionals and graduates are unhappy with OHS tertiary education	76
Table 6.1: Appropriate educational qualification for university OHS educators according to OHS professionals	82
Table 6.2: Appropriate experience levels for university OHS educators according to OHS professionals	82

Table 6.3: Factors that influence staff recruitment	83
Table 6.4: Factors that influence staff retention	84
Table 7.1: Benefits and issues to be addressed relevant to locating the OHS academy within the SIA OHS Educators' Chapter	91
Table 7.2: CoP characteristics and how they might be expressed in the Academy of OHS Education and Research	95

LIST OF FIGURES

Figure 2.1: The 'flower' model of OHS knowledge (Borys, 2008)	12
Figure 7.1: Potential activities of the Academy of OHS Education and Research	94

1. INTRODUCTION

In Australia today the education and training of Occupational Health and Safety (OHS) professionals is confronted by considerable forces of change: change in OHS professional practice; change in workplaces driven by socio-political, technological and financial challenges; and change in educational pedagogy, delivery methods and approaches to learning. Universities delivering OHS programs, and the OHS profession as a whole, are being challenged to meet current and emerging needs of an evolving stakeholder community. Considerable confusion within this community as to the requirements for, and function of, an OHS professional is exacerbated by the absence of a nationally accepted definition of what makes a person 'suitably qualified' for OHS employment. This 'identity crisis' is impacting on the ability of universities to meet rapidly accelerating workplace demand for generalist OHS professionals and threatening sustainable growth of the profession.

1.1 Research context

Australian workers' compensation records reveal high levels of work-related fatal and non-fatal injury and disease (NOHSC, 2004). Disturbingly, it has been estimated that more than 2000 people die annually from past occupational exposures to hazardous substances (NOHSC, 2002). In 2005-06, 689,500 people (6.4% of all workers) experienced a work-related illness or injury (ABS, 2006). While the national workforce grew by 12% between 2000-01 and 2005-06, the estimated number of workers who experienced a work-related injury grew by 44% (ABS, 2006). Aside from the pain and suffering generated, a huge toll is exacted on the Australian economy. In 2004, the National Occupational Health and Safety Commission (NOHSC) estimated total costs of workplace injury and illness for the 2000-01 reference year at \$34.3 billion (equivalent to 5% of GDP). Recently, the Australian Safety and Compensation Council updated this calculation; for the 2005-06 reference year, estimated total economic cost was \$57.5 billion, representing 5.9% of GDP (ASCC, 2009).

In recognition of the increasingly debilitating effect of occupational injury on economic and social prosperity, all Australian governments, the Australian Chamber of Commerce and Industry, and the Australian Council of Trade Unions pledged commitment to the *National OHS Strategy 2002-2012*. Recognising that work-related death, injury and disease are preventable, one of the strategy's priorities is to 'improve the capacity of business operators and workers to manage OHS effectively,' and one of the specified indicators of success is 'Increased OHS knowledge and skills in workplaces and the community' (NOHSC, 2002). Building the capacity for workplaces to manage OHS effectively is increasingly the province of tertiary OHS education.

After Australian tertiary-level OHS education began in the early 1980s, proliferation of undergraduate and postgraduate programs saw OHS develop as a discipline in its own right. Within two decades, however, a general downsizing of programs was discernable and many undergraduate programs were discontinued (Capra, 2006). In 2004, 17 Australian universities offered a total of 10 undergraduate, 37 postgraduate and 9 research-based OHS programs (Winder & Abdullah, 2004). In 2005, 1415 domestic students were enrolled in Australian university courses coded to the OHS field; of these courses, 71% were postgraduate (Kinnaird, 2008). By 2007, only three universities offered undergraduate OHS degrees. Although the vocational training sector is a source of OHS practitioners, it has been established that Australian employers prefer tertiary-qualified OHS professionals (Fowler, Sauer, Shaw, & Phillis, 1998; Moodie-Bain, 2003).

Ironically, attrition of undergraduate OHS programs has occurred in a climate of dramatically increasing demand for generalist OHS professionals. Compared with 11% employment growth for all professions in the five years ending February 2006, employment of Environmental and OHS professionals rose by 59% during the same period and, significantly, this category received a five-star rating for future jobs growth (Department of Employment and Workplace Relations, 2006). Furthermore, in 2006 the Department of Employment and Workplace Relations reported that the median age of Environmental and OHS professionals in the Australian workforce was 42, indicating significant depletion

of the current workforce within a decade. With high demand and projections of strong growth in OHS and environmental health, the university graduate undersupply problem is set to escalate.

For Australian universities to produce an adequate ongoing supply of OHS professionals capable of meeting the needs of employers and other stakeholders, obstacles must be overcome. One such obstacle is the absence of an agreed core body of OHS knowledge. Currently, the teaching of undergraduate and postgraduate programs is not unified; there is considerable variation in time spent on respective course components and, indeed, absence of agreement on what should constitute core OHS learning outcomes. Fundamental to this predicament is the difficulty of defining the discipline of OHS due to the diverse paradigms underpinning practice. This diversity accounts for the discipline's greatest strength, but also its greatest challenge. While strength results from harnessing elements from physics, chemistry, engineering, law, health, medicine, business and behavioural sciences to underpin practice, the challenge is to secure a cogent blend of knowledge and skills from the disparate disciplines. With OHS units found in science, health, business and engineering faculties and co-located with various other disciplines such as allied health and human movement studies, OHS educators are required to address more complex questions of epistemology than would normally be the case for single-discipline educators. Exploration of the current knowledge base underpinning the OHS discipline is crucial.

In 2004, Pryor recommended strategies to address the lack of agreed core content in OHS education, including: (1) an 'international' task questionnaire for OHS professionals; (2) consultative research to define the core knowledge and skills required by the OHS professional; and (3) establishment of an accreditation process for higher education OHS qualifications. The task questionnaire, Pryor's first recommendation, has been conducted and the results reported (Borys, Else, Pryor, & Sawyer, 2006; Hale & Guldenmund, 2006; Appendix 1). This project – *Safeguarding Australians* – provides the evidence base necessary to address Pryor's (2004) second and third recommendations.

1.2 Project scope

Safeguarding Australians is informed by current issues in OHS education, including:

- lack of an agreed core body of knowledge for OHS;
- lack of clarity regarding the required level of education for an OHS professional;
- appropriateness of current teaching strategies for equipping OHS professionals for operation in a changing business environment;
- appropriateness of external modes of delivery of OHS programs;
- availability of suitably qualified OHS educators; and
- preparation of OHS professionals to be lifelong learners.

The aim of this project was to facilitate alignment of OHS education with evolving workforce requirements by providing an evidence base from which informed decisions can be made. Key objectives were:

1. to provide, through engagement with key stakeholders, a basis for identification and development of core learning outcomes from university-based OHS programs in Australia;
2. to strengthen the discipline status of the profession while fully exploiting the multi-, inter- and trans-disciplinary interactions inherent in both practice and education;
3. to identify optimal learning environments for desired graduate outcomes; and
4. to provide a model for interdisciplinary delivery of OHS education that can be transferred to other emerging professions.

The project focuses on education of the generalist OHS professional, defined by Borys (D. Borys, personal communication, 2009) as one who applies “a generalist body of knowledge to provide businesses with advice on the organisational arrangements that will lead to the systemic and systematic management and prevention of OHS risks.” This role is differentiated from that

of an OHS specialist who applies high-level knowledge and skills from a particular domain/discipline to solve particular problems.

1.3 Report structure

Section 2 of this report presents a review of the literature relevant to education of the generalist OHS professional with thematic focus on integrity of the profession, student learning in OHS and the OHS 'academy.' Section 3 identifies the necessity for responsiveness in research design and outlines project methods geared to maximising involvement of key stakeholders via focus groups, survey questionnaires, telephone interviews and a workshop. Section 4 explores the disciplinary underpinning of current OHS tertiary education and stakeholder expectations of the learning outcomes and underpinning curricula required for OHS professional competency, and offers guidelines for sustainable development of tertiary OHS education. Specific strengths, challenges and gaps in the current delivery of OHS education as perceived by key stakeholder groups are outlined in section 5. Section 6 assesses the sustainability of the academy of OHS educators, and section 7 discusses establishment of a transdisciplinary 'community of practice' of OHS educators capable of addressing the evolving needs of OHS education into the future. Finally, section 8 acknowledges project limitations and discusses project outcomes.

2. LITERATURE REVIEW

This section reviews the literature relevant to education of the generalist OHS professional with thematic attention on integrity of the profession, student learning and the OHS 'academy.' As the focus is on OHS 'professionals,' this review is limited to issues related to OHS professional education in the higher education sector.

2.1 Integrity of the OHS profession

2.1.1 Evolution of the OHS professional

The following description of the evolution of the Australian OHS professional role is based on Pryor's (2008) summary of the development of the role and profile of the OHS professional.

Historically, OHS has been dominated by the medical profession (Quinlan & Bohle, 1991). The role of the OHS practitioner began to emerge in the 1970s as a technical role provided mainly by people with a trade background, often appointed following an incident of work-related injury (Mayhew & Peterson, 1999). During this time the need for specialised OHS qualifications was identified and endorsed by the government (SIA, 2001), but few practitioners had any specialised training.

With the advent of OHS qualifications provided by the higher education sector, the 1980s and 1990s saw the OHS practitioner role evolve into an advisory/consulting role. During the 1980s, OHS practitioners were involved mainly in processing information; very few undertook implementation or monitoring activities (Dawson, Poynter, & Stevens, 1984). These practitioners ranged from highly qualified professionals to those who did little more than maintain basic records (Dawson et al., 1984). While there was pressure for greater integration of practitioners into management (Dwyer, 1992), there was

considerable disagreement between specialists and the various workplace players as to the role of the safety specialist (Dawson et al., 1984). The recommended shift to a management role was reflected in the suggestion that an OHS practitioner should change from a technical expert to a generalist with strong human relations and management skills (Brun & Loiseau, 2002). This developing awareness of the need for management and communication skills was recognised also in the USA (Blair, 1997; Eckenfelder, 1998; Nelson, 1994). Relatively recently, however, an international survey revealed that core tasks carried out by OHS professionals reflected a conventional view of the technically oriented practitioner not far removed from that which prevailed decades ago (Hale & Guldenmund, 2006).

Pryor (2008) noted that Robens-style legislation has resulted in the OHS professional having a low profile with national policy makers and OHS regulators. The OHS profession also suffers from a low profile in the community, where a perception of OHS as a 'worker' issue prevails. Despite public relations campaigns by OHS regulators in the 1990s, OHS was a 'middle order' rather than a major community concern, ranked well below concern about road safety. While acknowledging employer responsibility, there was a general sense of inevitability about OHS incidents and a perception of workers' compensation courts and a stigma attached to receiving workers compensation (NOHSC, 1999). A 2008 survey found that Victorians ranked workplace injuries seventh behind issues such as public health, health and wellbeing, drug and alcohol addiction, road safety and the education system (Sweeney Research, 2008). Research with small business found little evidence of change in community perceptions, with work-related injury and ill-health attributed to 'person' factors such as worker carelessness and lack of training (Cowley, 2006).

In Australia today, OHS is recognised as a management responsibility; however, suitably qualified OHS advisers have a role and this is recognised in OHS legislation in some states. Depending upon the nature of the problem, OHS advice may be provided by generalist OHS advisers or specialist advisers such as ergonomists, occupational hygienists and occupational medical officers.

Borys et al. (2006) reported that OHS professionals tend to work in large organisations and across multiple sites; they most commonly work as internal advisers, although external consultants can potentially work with small, medium or large organisations. The OHS professional is most likely to be a sole practitioner or work with only one other person from their field. The industries where OHS professionals most commonly work are, in descending order: manufacturing; mining, oil and gas; personal and other services; health and community services; transport, storage and communication; education; and construction (Borys et al., 2006). The OHS government inspectorates also employ OHS professionals.

Historical context and community perception have impacted on the education of the OHS professional and the integrity of the profession. The current situation is discussed in relation to the role and disciplinary underpinning, educational requirements and accreditation of OHS professional programs.

2.1.2 Lack of clarity of role and disciplinary underpinning

There is no clear agreement on the scope of the role of generalist OHS professionals in Australia or internationally. Under a variety of titles such as 'officer,' 'adviser,' 'coordinator,' 'manager' or 'consultant,' OHS professionals provide advice and apply principles drawn from disciplines such as engineering, science, physiology, biomechanics, psychology, organisational behaviour, education, law and business management. This array of disciplines is reflected in the variety of university faculties hosting OHS programs; these include science, health science, behavioural science, public health, engineering and business. Pryor (2004) reported that course content varies depending on the 'home faculty'; anecdotal information suggested that university academic boards often do not know where to site the OHS academic stream: is it science, is it health, or is it management?

Confusion surrounds the disciplinary underpinning of generalist OHS education. Drawing on an example of educating engineers in principles of safe design, Toft (2007) identified the objective as 'transdisciplinary' education where skills and

knowledge from the various disciplines are drawn on and the disciplinary boundaries become merged, or blurred, so that a new 'reality' or knowledge emerges that is different to the reality of any of the disciplines involved. This can be contrasted with 'multidisciplinary' approaches where knowledge from the different disciplines is applied side-by-side to solve a problem, or 'interdisciplinary' approaches where the tools and knowledge from one discipline are transferred to another. The challenge is for transdisciplinary education to involve "socially robust, professionally relevant and collaborative learning and teaching, centred on problem solving" (Toft, 2007). However, the structure and functioning of universities tends to militate against such education as research and teaching is usually discipline-based, single authorship is rewarded over collaboration, and there is little time for peer collaboration and reflection by teaching and research personnel.

2.1.3 Lack of an agreed core body of knowledge

Prior to 1980 there were no tertiary OHS programs in Australia. By 1990 there were four undergraduate and six postgraduate OHS courses. A 2003 survey found that at least 17 universities offered at least one program in OHS (Pryor, 2004; Winder & Abdullah, 2004). In 2008, 15 universities offered a total of 6 masters programs, 11 graduate certificate/graduate diploma programs and 5 bachelor degrees (P. Pryor, personal communication, 2008).

Bluff (2006) noted that the general lack of qualification and experience requirements for OHS professionals in Australian legislation means that Australian education providers have considerable discretion in determining course content and assessment. Following the National Occupational Health and Safety Commission's (NOHSC) 1994 publication of a *Guidance Note for the Development of Tertiary Level Courses for Professional Education in Occupational Health and Safety*, which nominated minimum requirements for Australian OHS education programs (NOHSC, 1994), several authors contributed to the discussion on what should constitute core learning for the OHS professional (e.g. Pisaniello, 1998; Spickett, 1999). This discussion,

however, focused on the knowledge and experience of the OHS educators rather than on evidence-based research.

After analysing results from Winder and Abdullah's (2004) survey of 17 university OHS courses, Pryor (2004) confirmed the absence of a defined core body of knowledge for OHS professionals. At the foundation level, the highest degree of commonality was for OHS management and law (71%), while hazard-specific topics featured commonality across 94% of courses for ergonomics/human factors, 59% for occupational hygiene/workplace assessment, and 29% for OHS hazards and controls. Other areas of concern identified were: the low profile given to interpreting trend information and critically analysing information; the varied approaches to hazard and risk management; and the minimal attention given to identification of emerging trends, organisational behaviour and skills in influencing key decision makers (Pryor, 2004). A 2006 review of the content of OHS undergraduate degrees reinforced this assessment (M. Capra, personal communication, 2007).

The implications of this lack of a common core of OHS knowledge have been discussed by members of the OHS professional bodies and Victorian OHS educators under the auspices of the Health and Safety Professionals Alliance (HaSPA), formed in 2007. An initiative of WorkSafe Victoria, this alliance brought together OHS professional associations and OHS educators with the objectives of promoting OHS as an area of professional practice and improving OHS service delivery to Victorian workplaces. In 2008, HaSPA released a *Victorian Code of Ethics and Minimum Service Standards for Professional Members of OHS Associations*. The minimum service standards include the requirement for professional certification for OHS professionals providing independent advice. Criteria for certification includes completion of an approved education program or an alternative means of establishing that the applicant has the required knowledge, expertise and competencies; demonstrated practical expertise; and a minimum period of full-time practice or equivalent (HaSPA, 2008).

Discussions at HaSPA meetings identified the lack of a recognised body of knowledge informing the education and practice for the OHS generalist. Subsequently, a working party was established under the auspices of the Safety Institute of Australia to consider how the core body of OHS knowledge for the generalist OHS professional might be conceptualised and what it might contain. Resolutions achieved by this working group as a result of four workshops were:

1. OHS is a multidisciplinary field of practice;
2. OHS professionals should be able to understand and explain the aetiology of workplace fatalities, injuries and disease;
3. the 'flower model' provides a tool for conceptualising the core body of OHS knowledge;
4. systems thinking is a useful framework for thinking about OHS;
5. the OHS body of knowledge should be considered in light of the broader issue of becoming a profession;
6. OHS is an applied science and the focus should be on solving problems; and
7. Hoyle's (1975) professional orientation attributes for teachers is useful as a basis for constructing the professional orientation attributes for OHS professionals (Borys, 2008).

The 'flower model' as noted in (3) above is depicted in Figure 2.1. The continuum of professionalism described by Hoyle (in Borys, 2008) provides a useful basis for constructing the professional attributes of OHS practitioners and professionals (Table 2.1).

As part of a strategy titled 'Repositioning the professional', WorkSafe Victoria have provided funding to develop and implement the core body of knowledge for generalist OHS professionals. Although Victorian-based, the project plans extensive consultation with OHS educators in all states. Key steps in the project plan for developing the core body of knowledge are: development of a conceptual framework; data collection by reviewing literature, current courses, international requirements, other projects (such as *Safeguarding Australians*), and surveys of OHS professionals; analysis of data to identify major themes and sub-themes; consultation on

emerging themes; and development of the draft body of knowledge followed by validation (Bennett, 2009).

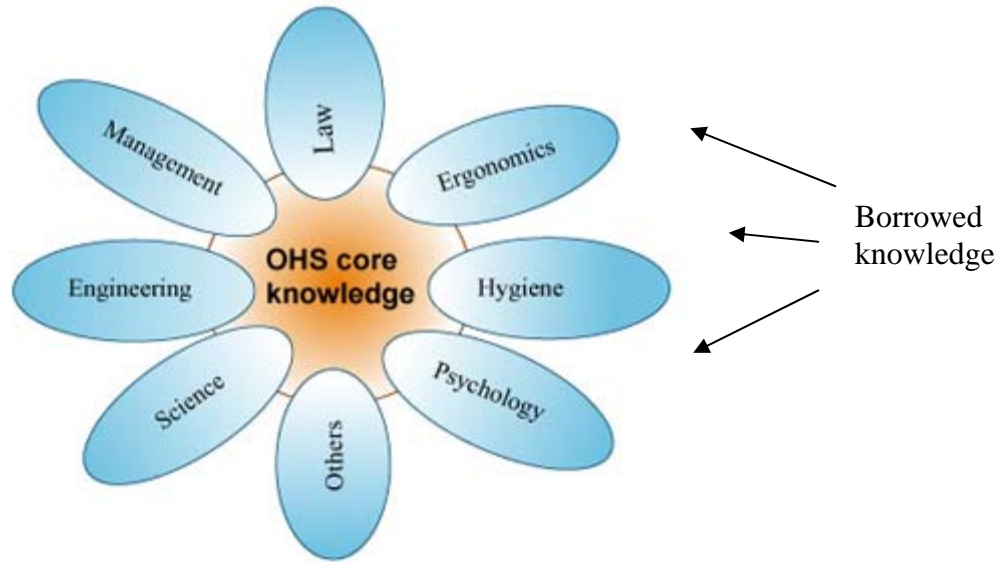


Figure 2.1: The ‘flower’ model of OHS knowledge (Borys, 2008)

Table 2.1: Hoyle’s professional orientation attributes for teachers

<p style="text-align: center;">Practitioner <i>Restricted professionalism</i></p>	<p style="text-align: center;">Professional <i>Extended professionalism</i></p>
<ul style="list-style-type: none"> • Skills derived from experience • Perspective limited to the immediate in time and place • Introspective with regard to methods • Value placed on autonomy • Infrequent reading of professional literature • Teaching seen as an intuitive activity 	<ul style="list-style-type: none"> • Skills derived from a mediation between experience and theory • Perspective embracing the broader social context of education • Methods compared with those of colleagues and reports of practice • Value placed on professional collaboration • Regular reading of professional literature • Teaching seen as a rational activity

(Hoyle in Borys, 2008)

2.1.4 Lack of clarity on required educational level

The OHS profession is currently an unregulated profession. There are no qualification and experience requirements for people working in the field or claiming a title related to OHS. Excluding research qualifications, current practitioner training and education ranges from Certificate IV and Diploma/Advanced Diploma to undergraduate and postgraduate degrees with entry potentially at any level (Pryor, 2004).

In 2006, an international study found a close correlation between the level of professional education and the nature of the work undertaken by OHS professionals with higher-educated professionals dealing with safety design, policy making, safety management and performance indicators while those with lower-level professional education operated in a technical role centred on procedures, instructions, compliance checks, discussions with employees and supervisors, physical inspections, behavioural audits, accident statistics and emergency drills (Hale & Guldenmund, 2006). Australia was the only country in the survey group where there was practically no statistical difference in the task profiles between higher-educated (bachelor-level or above) and vocationally educated professionals. There may be some clarity emerging as a recent Australian survey that compared OHS professional role/title with level of education in 51 organisations found a clear correlation between increasing level of position and higher level of OHS qualification; 69% of national OHS managers (n=31) and 83% of general OHS managers (n=25) surveyed had degree or postgraduate qualifications, and nearly 40% of the general OHS managers held masters or doctoral qualifications (Safesearch, 2008). However, a survey of recruitment advertisements for OHS-related positions found that employers still had widely varying perceptions of the role and educational requirements of the OHS professional (D. Moodie-Bain, 2008).

What are the implications of this lack of clarity in educational requirements? Spickett (1999) commented that the objective of training is to meet the needs of the marketplace, while that of education is to shape the marketplace. Pisaniello (1998) raised a concern about lack of critical thinking in the development and

application of OHS practices and recommended that OHS students should be encouraged to “question critically every aspect of conventional wisdom in OHS.” Pryor (2006) identified major concerns related to a lack of involvement by OHS professionals with senior management, a focus on functional roles rather than strategic development, and a low level of involvement by OHS professionals in design and planning activities. Pryor (2006) questioned the source of these outcomes of concern. Are they attributable to the education of the OHS professional? Is the OHS professional responding to workplace and organisational pressures? Are these outcomes occurring because the OHS professional does not have the skills and attributes to operate at a strategic level and to set the agenda rather than just respond? These questions contribute to the earlier discussion on the lack of an agreed core body of knowledge, and raise the issue of a need for incorporating higher-level, analytical thinking and influencing skills in the core skills for OHS professionals. The certification criterion requiring completion of an ‘approved’ education program raises the question as to the qualification level required for OHS certification and thus independent practice.

Currently, Western Australia and Victoria have a legislated requirement for employers to engage ‘suitably qualified’ persons to provide OHS advice. This requirement has been included in the recommendations for national model OHS legislation (Stewart-Crompton, Mayman, & Sherriff, 2009). Until recently, no definition of what constituted ‘suitably qualified’ in this context existed. In October 2008, WorkSafe Victoria published a statement on application of the legislation in relation to engaging suitably qualified persons, advising employers that areas to consider when assessing whether a person has the skills, knowledge and experience to be suitably qualified include factors related to knowledge, industry experience, professional activity, reputation, professional association, communication skills, technical expertise, OHS legislative understanding and OHS risk management strategies (WorkSafe Victoria, 2008).

Taking another perspective on the issue of ‘suitably qualified’, for many years the Safety Institute of Australia has applied a grading system that recognises

members' qualifications and experience. Responding to discussions within HaSPA, the Institute revised the professional membership criteria, setting the requirement for Chartered Professional Member (CPMSIA) as a bachelor degree, graduate diploma or masters in OHS (SIA, 2009). While not all OHS professionals or practitioners are members of the Safety Institute of Australia, this is an example of an industry standard, especially as the certification must be administered through a professional body (HaSPA, 2008).

2.1.5 Lack of course accreditation

There is an accreditation process for OHS qualifications in the United Kingdom (IOSH, 2006) which is open to Australian universities. While the Australian OHS professional role has considerable commonality with its UK counterpart, limitations of the UK accreditation criteria and process were identified at a 2004 Safety Institute of Australia workshop.

The lack of external course accreditation process for Australian OHS professional qualifications means that course approval is subject only to each university's internal processes, with the resultant wide variations in programs identified in this review. Implementation of a professional certification process requires identification of 'approved' courses through course accreditation; however, such a process cannot be developed without a defined body of knowledge. This deficiency will be addressed through the WorkSafe Victoria funded 'Body of Knowledge' project as the implementation phase of this project includes development of criteria and a process for accrediting OHS programs for generalist OHS professionals (Bennett, 2009). It is proposed that accreditation will be administered by the Safety Institute of Australia.

2. 2 Student learning in OHS

Quinlan (1995) summarised pre-1995 academic discussion on OHS professional education in Australia, pinpointing major events as: a workshop of

OHS academics and professionals organised by the Menzies Foundation to address the issue of core curriculum (1983); a seminar on OHS specialist education conducted by the National Occupational Health and Safety Commission (1986); formation of a multidisciplinary committee of educators and professionals (1992) which resulted in publication of the *Guidance Note for the Development of Tertiary Level Courses for Professional Education in Occupational Health and Safety* (NOHSC, 1994); and the first multidisciplinary conference of OHS educators (1994). While these events were important in initiating discussion about OHS professional education, they did not translate into research of OHS educational processes. Poon (1998) lamented this lack of research in education of safety professionals; in 2009 the field is still characterised by a paucity of rigorous research on OHS educational outcomes and limited academic discussion.

In addition to a lack of documented research and evaluation of educational processes in OHS professional education, this review is curtailed by a lack of agreed graduate attributes for OHS professional education. Consequently, it is necessary to turn to other professions and generic education research for relevant information. From the huge body of literature on educational theory and practice, this section distils some key concepts applicable to OHS education. It explores issues relating to teaching and learning strategies and modes of delivery for education of OHS professionals. This discussion is underpinned by a brief review of the requirements for effective learning.

2.2.1 Requirements for effective learning

In discussing the education of teachers, Turbill (2002) provided insight applicable to education of OHS professionals. Building on Hiebert, Gallimore and Stigler's premise that 'practitioner knowledge' must become 'professional knowledge' through reflective sharing and discussion, Turbill (2002) concluded that, for teachers to build their own professional knowledge, they must first make their tacit knowledge conscious and public in order to integrate new knowledge with old. This process is activated through language exercised while collaborating with others, in sharing and reflecting. Turbill (2002) conceptualised

language as more than communication; it is a powerful tool with an important role in learning.

This constructivist approach to the development of knowledge has been appropriated by many writers in discussions of teacher-centered versus learner-centred pedagogy. It is generally accepted that “To make learning outcomes meaningful in any teaching environment, students should be actively engaged in their own learning” (Williams, 2006). Moore (in Smith, Ferguson, & Caris, 2001) and Oerlemans, May and Hurle (2007) prescribed two further dimensions of successful learning; in addition to learner-content interaction, there must be learner-instructor interaction and learner-learner interaction. This raises the question of the balance between these interactions. Gallie and Joubert (2004) presented the student-instructor interaction as a continuum. Comments by others, as discussed in section 2.2.2, indicate that depending on the learner, the topic and the context, it may be appropriate to operate at different locations on this continuum.

Learning, especially in higher education, is fundamentally a social and reflective process (Herrington & Oliver, 2002; Engestrom and Wenger as cited by Guile & Young in Deignan, 2009), and teaching and learning as an activity is socially situated (Engestrom in Deignan, 2009). The role of social interaction in learning was emphasised by Boud, Keogh and Walker (in Herrington & Oliver, 2002) who, in defining reflection as “those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations” rendered reflection a social process. The social model of learning is supported by Deignan (2009), who investigated staff responses to an alternative method to classroom teaching in higher education, and found two areas of consensus: teaching methods need to incorporate a social aspect of learning, and students can learn from the efforts of their peers as well as from their own efforts.

Providing OHS advice to prevent workplace injury and illness is complex; the requirement for complex learning outcomes has parallels with engineering

education (Knight, 2004), requiring deep rather than surface learning. According to Ramsden (in Le & Tam, 2007) deep learning is encouraged by:

- (i) methods that foster active and long-term engagement with learning;
- (ii) stimulating and considerate teaching;
- (iii) clearly stated academic expectations;
- (iv) appropriate and timely feedback;
- (v) opportunities to exercise responsible choices in the method and content of study; and
- (vi) interests in background knowledge of the subject matter.

Griffith Institute for Higher Education (in Le & Tam, 2007) rephrased these requirements for deep learning as that which:

- (i) supports independent learning;
- (ii) organises appropriate learning activities;
- (iii) encourages interaction with others; and
- (iv) uses appropriate assessment practices that reward deep learning and informs learners in advance of the required criteria and standards.

As a result of face-to-face teaching research, Turbill (2002) identified a similar list of 'enabling factors' required to support learning which could be readily applied to OHS professional education. These enabling factors are: time for reflection, both written and oral; time for sharing (classroom) experiences and responses to readings with peers; opportunities for collaborative learning in small groups; opportunities to try new (classroom instructional) strategies; input of new knowledge through a variety of media; readings that support and extend the various concepts introduced in the courses; and opportunities to work as co-learners (Turbill, 2002).

In the absence of research into strategies for student support and educational outcomes specific to OHS professionals, the above criteria for deep learning and professional education will be used to underpin the review of literature relating to teaching and learning strategies and modes of delivery for education of OHS professionals.

2.2.2 Teaching and learning strategies

Based on the assumption that learning is a social and reflective process that requires at least an element of student-centred activity, this review considers literature on problem-based-learning (PBL), project-based-learning and team-based-learning (TBL). While there is often overlap in these learning approaches and, in some cases, the terms are used interchangeably, they are discussed under separate headings in this review. In each case the 'innovative' methodology is compared with traditional classroom teaching.

Problem-based learning

Problem-based learning (PBL) is defined by Barrows and Tamblyn (in Deignan, 2009) as “the learning that results from the process of working toward the understanding or resolution of a problem.” This involves small groups of learners, supported by a tutor, engaging with a complex problem or scenario where the learners direct the lines of enquiry and choose the methods employed. It attempts to situate learning in situations that are similar to those faced in practice (Hmelo, 1998). Barrows (in Hmelo, 1998) lists three goals of PBL: to help learners integrate basic science and (clinical) knowledge; to facilitate the development of (clinical) reasoning skills; and to help learners develop lifelong learning skills. PBL is sometimes referred to as enquiry-based learning as learners must uncover aspects of the problem through an enquiry process (Hmelo, 1998).

In higher education, PBL has been implemented broadly in medical schools in Australia, Europe and the US. Much of the body of PBL-related literature examines the impact of this learning approach on physicians (Hmelo, 1998; Koh, Khoo, Wong, & Koh, 2008). Even within this professional area the implementation of PBL varies widely (Koh et al., 2008; Deignan, 2009). While much of the literature is positive regarding the benefits of PBL, Sanson-Fisher and Lynagh (2005) hypothesised that the widespread adoption of PBL is more a consequence of it meeting criteria for successful dissemination than of demonstrable positive outcomes. Their major concern is that learners following a PBL approach consistently graduate with a knowledge of basic science that is

inferior to, or at best on a par with, that of students taught in traditional courses. Sanson-Fisher and Lynagh (2005) warned that the existence of many reports that learners and staff prefer PBL should not be taken to imply better learning outcomes.

Initially, Koh et al. (2008) also queried the rigour of some of the evaluative research on PBL; however, following systematic analysis of the literature on outcomes for medical education, these authors expressed confidence that PBL does have positive effects on physician competencies after graduation, especially in the social and cognitive dimensions. While there was variation in self-assessed reports and observed reports, for the eight dimensions examined the social dimension showed the strongest evidence in support of PBL. This dimension included teamwork; appreciation of social and emotional aspects of healthcare; appreciation of legal and ethical aspects of healthcare; and appropriate attitudes toward personal health and wellbeing, communication and inter-personal skills. In the technical dimension, diagnostic skills and continuity of care were strongly supported by PBL; while in the cognitive dimension, coping with uncertainty and understanding of evidenced-based medicine were strongly supported by PBL. While knowledge levels were assessed by many to be lower for PBL, knowledge application was assessed as higher. Dimensions not found to be supported by PBL were managerial skills, research and teaching (Koh et al., 2008).

PBL has been implemented, to a limited extent, in engineering education (Mills & Treagust, 2003). It is recognised that engineering education needs to address communication and teamwork skills, and to develop an awareness of social, environmental, economic and legal issues; PBL is seen to support development of these skills (Mills & Treagust, 2003). However, Mills and Treagust (2003) reported problems implementing this learning approach in engineering as PBL may not lead to development of the 'right' knowledge; whereas medical knowledge is 'encyclopaedic' where the order in which the knowledge is learned is not fixed, mathematics, physics and much of engineering have a hierarchical structure requiring fixed-sequence learning. Also, in medicine there is usually

only one correct answer to the problem (the diagnosis), whereas in engineering there may be a number of design options (Mills & Treagust, 2003).

While there is variation in application of PB, there are some common factors that may impact on its effectiveness. Table 2.2 provides a summary of these factors derived from a selection of the literature.

Table 2.2: Factors that may impact on the effectiveness of problem-based learning (PBL)

Factors that may impact on effectiveness of PBL	Possible amelioration
Learners may have difficulty in adapting to the process (Deignan, 2009) with adult learners possibly having greater difficulty (Connell, 2003)	Learners need to be prepared for PBL (Mills & Treagust, 2003), possibly through an orientation workshop (Connell, 2003)
The role of the tutor is vital but staff may be challenged by the approach (Koh et al., 2008; Deignan, 2009)	Lecturers and tutors need specific training (Deignan, 2009)
Size of group (PBL requires small groups of learners usually lead by a tutor) (Hmelo, 1998)	
Demands on tutors are greater than for traditional methods (Deignan, 2009)	Additional teaching staff required (Koh et al., 2008)
Assessment is more problematic than in traditional coursework (Deignan, 2009)	
Implementation across a curriculum requires interest, cooperation and integration of all the faculty and in some cases other faculties (Mills & Treagust, 2003)	
The nature of the knowledge base, i.e. encyclopaedic versus hierarchical (Mills & Treagust, 2003)	

This discussion on PBL raises several questions for OHS professional education. Like physicians and engineers, the effective OHS professional must have good communication, analytical and critical thinking skills, and be able to interact with a broad range of people and explain technical issues and defend their positions (Pryor, 2004). The OHS professional has to deal not only with new technologies, changing legislation, social and cultural adjustments and organisational transformations but also changes to their role. Candy (2000) described the challenge of preparing OHS professionals as twofold: to ensure that they are technically competent subject-matter experts and, even more importantly, that they develop and demonstrate the attributes of skilled and committed lifelong learners. Thus PBL may be an appropriate learning strategy for OHS education.

While some aspects of the OHS knowledge base are encyclopaedic, and therefore like medicine, there are also hierarchical components to the knowledge base. The major factor impacting on the effectiveness of PBL may be that in OHS there is rarely only one answer to a problem. While there are no documented examples of PBL in OHS professional education, it may be occurring to some extent in some courses. Thus the role of PBL in OHS professional education is an area requiring investigation.

Project-based learning

As noted earlier, problem-based learning and project-based learning are closely related; some authors use the terms interchangeably (Barron, 1998). For the purposes of this review, a project is defined as a unit of work involving planning, developing and implementing an outcome for a client. In the case of project-based learning, the time scale may vary from quite short (1-2 weeks) to a semester or a year; projects, of varying complexity, may be carried out by individuals or small groups for actual or virtual clients (Mills & Treagust, 2003).

Mills and Treagust (2003) noted that many of the outcomes of project-based learning are similar to those claimed for PBL. Perrenet et al. (in Mills & Treagust, 2003) compared tertiary-level PBL and project-based learning and

found that both are based on self-direction, collaboration and a multidisciplinary orientation. Differences included: project tasks are closer to professional reality and therefore take longer than PBL problems; project work is more directed to the application of knowledge, whereas PBL is more directed to the acquisition of knowledge; project-based learning is usually accompanied by course work whereas PBL learning is not; project-based learning emphasises management of time and resources as well as task and role differentiation; and self-direction is stronger in project work (Perrenet et al. in Mills & Treagust, 2003). Kolmos (in Mills & Treagust, 2003) found the two types of learning supported each other by emphasising different aspects of learning; a key difference is that in project-based learning the teacher is a 'product-oriented supervisor' whereas in PBL the teacher is a 'process-oriented supervisor.'

Project-based learning has been implemented in a number of engineering schools in Australia and overseas. Evaluations comparing project-based learning with traditional engineering education found similar outcomes to that of PBL. Comparison of evaluations (based on student self assessments) of programs at Aalborg University in Denmark (where 75% of the curriculum is project-based) and the Danish Technological University (with a traditional program) found that

...both programs were excellent but the graduates focused on different skills. Aalborg graduates were stronger in team skills, communication, ability to carry out a total project and generally were more adaptable and thus, more directly employable on graduation. DTU graduates were stronger in engineering fundamentals and more capable of independent work, but will generally require more on-the-job training (Mills & Treagust, 2003).

Retention rates were significantly higher at Aalborg. With 75% of the curriculum project-based, Aalborg is an exceptional example. Central Queensland University has approximately 50% of engineering student workload in each semester allocated to project-based work; a more common scenario is provided by Victoria's Monash University engineering program where the extent and complexity of project-based work is phased in over the four years (Mills & Treagust, 2003).

Mills and Treagust (2003) concluded that, for engineering education, project-based learning may be more applicable than PBL as project-based work is more like 'real engineering.' Like PBL, project-based learning has some important learning outcomes in team-work, communication, problem solving and application of knowledge; however, there is the risk of a less rigorous understanding of engineering principles. The requirements for engineering education are not likely to be met by traditional lecture-style programs; therefore a mixed-mode, with a more traditional approach supported by some directed projects in the earlier years moving to project-based work of increasing complexity and learner autonomy in the later years, may become the norm. As project-based learning is seen to have similar implementation issues as PBL, such a program would require appropriate resources and training in the methodology for both learners and teachers.

An interesting variation on project-based learning in engineering has been implemented at Central Queensland University where integrated teams of engineering students and ergonomics students worked on a design project (Toft, 2007). The literature provides few examples of analysis of teaching/learning strategies in OHS professional education, however anecdotal information suggests that a form of project-based learning is employed in some programs, most often through assessment tasks.

Team-based learning

As with the discussion of PBL and project-based learning, in some cases it may be difficult to determine whether team-based learning (TBL) is a different methodology or a variation or enhancement of one or both of the other two. The objectives of TBL are similar to those of PBL and project-based learning in that TBL offers students the opportunity to practice using course concepts to solve problems; the role of the instructor changes from dispensing information to designing and managing the learning process, and the learner's role shifts from passive to active (Michaelsen & Sweet, 2008). Michaelsen and Sweet (2008) identified four requirements of effective TBL: properly formed and managed groups; learners accountable for the quality of their individual and group work;

frequent and timely feedback to learners; and assignment tasks designed to promote learning and team development. While many educators would say they include team or group learning in their programs, it is the detail within these four key factors that seems to separate TBL from the less-structured approaches. The four factors also appear to address negative student response to project-based work where students complain of problems with group members who 'freeload' (Willey & Freeman, 2006). TBL is cost-effective compared with problem-based or project-based learning (Michaelsen & Sweet, 2008; Sibley & Parmelee, 2008). TBL requires that learners are informed of the learning objectives; the reason for employing TBL; and suggestions for working in a team, giving helpful feedback and conflict resolution (Willey & Freeman, 2006; Michaelsen & Sweet, 2008). Concerns about assessment grades also need to be addressed. While TBL provides learners with multiple opportunities for learning many do not realise how much they have learned; therefore a review of concepts near the end of the topic or course may be required to reinforce the learning.

The following criteria for effective TBL were reported by Michaelsen and Sweet (2008) and supported by Sibley and Parmelee (2008):

Team groups: should be as diverse as possible so that members bring a range of perspectives to the task; grouping is determined by the teacher or random to avoid 'coalitions' that may be disruptive; and groups are stable for a period of time to allow group dynamics to develop. This basis for determining groups mimics the workplace where people rarely get to select with whom they work.

Learner accountability: for pre-class preparation, contribution to the team and for quality of output for the team. This criterion is linked with that of immediate feedback as it impacts on group development. Pre-class preparation, which may include reading papers or completing tutorials, is a vital part of TBL and the first aspect of accountability. Multi-choice tests are recommended to confirm knowledge preparedness to participate in team activity but

this may not be appropriate in many areas of OHS knowledge. In some cases knowledge tests are repeated with teams providing a consensus response. Peer assessment of contributions to the team effort is seen as vital to effective TBL. Various strategies including paper-based and online questionnaires have been developed to support peer assessment.

Assignment design: impacts on the group dynamics with the most effective assignments involving a justified decision requiring discussion of known content. Assignments requiring a lengthy report often limit learning as discussion is shorter because learners feel an urgency to create a product and, instead of focusing on content issues, they may divide up the work. Assignments should be significant to the learners; all learners should work on the same assignment and groups should simultaneously report their outcome. The latter two criteria may be problematic in some programs where having groups work on different topics/problems is seen as a way to add breadth to the content covered. This eliminates meaningful discussion as students are unlikely to engage on a topic for which they do not have ownership.

TBL is seen as a powerful form of small-group learning that supports the development of professional competencies of problem-solving, communication, collaboration and lifelong learning, together with mastery of content in order to apply it, rather than simply 'covering content' (Sibley & Parmelee, 2008). Also, TBL can be employed in e-learning situations (Pasole & Awalt, 2008).

Swuste and Arnoldy (2003) reported on a program in OHS professional education that approximates this description of TBL. Having recognised the need for OHS professionals to be agents of change, they incorporated a module on change management into a postgraduate OHS professional program. The module was based around an assignment requiring teams to prepare a presentation on "how to initiate and realise lasting behavioural change without authority;" presentations were judged by a panel and the winning team received

an award. The training featured: knowledge preparation through a variety of modes including themed lectures, guest lecturers, access to multimedia library resources, a professional learning facilitator, mini interpersonal skills sessions selected by the individual learner from a menu of choices, and pre-module self-study material; a competitive environment with limited time; a facilitator whose role was to tease and challenge the teams as much as possible; and all teams working on the same topic (Swuste & Arnoldy, 2003). While the outcomes were positive and learners tackled the task with enthusiasm and effort, the program provided insight into the challenges of using such teaching and learning strategies in OHS professional education. Some learners had difficulty adjusting to the lack of structure and the need for self-directed learning; they also were unwilling to challenge guest lecturers to engage in rigorous and rich discussion. Other factors identified as potentially impacting on the learning outcomes were the quality of the guest lecturers, the skill of the facilitator in creating a sense of pressure and urgency, and the skill of panel members in turning the final presentation from a contest into a real learning experience (Swuste & Arnoldy, 2003).

2.2.3 Mode of delivery

There are a variety of modes of delivery of OHS qualifications in Australia ranging from traditional on-campus, external mode supported by on-campus workshops and block mode to total off-campus delivery (Pryor, 2004). External mode, or distance education, has become a key feature of postgraduate OHS education in Australia, with increasing use of electronic strategies to support student learning (Pryor, 2004). Gardner and Hall (2001) raised concerns about distance education programs in OHS, specifically noting the limited opportunity for students to interact with each other in cooperative project work and for development of motor skills such as those required for use of equipment. Similar issues have been raised regarding the use of electronic strategies to support external student learning; of particular concern is the development of hands-on skills, and the level and nature of interactions with other learners and educators (Gardner & Hall, 2001; Pryor, 2004; Toft, Trott, & Keleher, 2006).

Reviewing the literature on distance education (DE) is complicated by the various interpretations of what constitutes DE and the relative role of electronic-mediated learning (e-learning), and a tendency for the two terms to be used interchangeably. Guri-Rosenblit (2005) differentiated between DE and e-learning:

Distance education targets students who, for a variety of reasons, cannot attend a face-to-face campus; it is characterised by separation of learner and teacher in both space and time, and the absence of a learning group throughout the length of the learning process. DE was originally introduced to broaden access to higher education by providing economies of scale for a large number of students. In most higher education systems, DE is still conducted through 'old' technologies, mainly print but also radio, television and satellite broadcasts. The lack of direct teacher-student communication and the expense of maintaining up-to-date content material have been identified as major issues.

E-learning, mediated through information and communication technology, is used by all types of learners, at all educational levels, both on and off-campus, and offers a plethora of learning/teaching strategies beyond the ability to transfer the content of textbooks and lectures to students at a distance.

Thus, while there may be overlap with some DE learners involved in e-learning, distance is not necessarily a characteristic of e-learning, and the two modes are based on different learning and teaching paradigms (Guri-Rosenblit, 2005). As traditional print-based DE does not meet the criteria defined by Turbill (2002) (section 2.2.1), it is considered inappropriate for professional OHS education. The remainder of this section refers to e-learning which may be part of on-campus delivery, distance education or blended modes.

In the late 1990s and early 2000s, it was forecasted that Information and Communication Technologies (ICT) would bring sweeping change to higher

education; subsequently, many of these claims have been found to be exaggerated predictions based on erroneous assumptions (Turbill, 2002). Before examining the characteristics of effective e-learning it is important to debunk these erroneous assumptions. E-learning is not cheaper than face-to-face teaching (Turbill, 2002), in fact it is likely to be more expensive (Guri-Rosenblit, 2005); it is not easier teaching (Turbill, 2002); it does not necessarily replace face-to-face teaching (Guri-Rosenblit, 2005); and it does not replace the campus as a geographically concentrated community of scholars and centre of culture (National Research Council, USA, in Turbill, 2002). Assogbavi (2005) reported that the potential for e-learning has not been achieved and many programs have failed due to misinterpretations of the market, unrealistic estimation of start-up costs, inappropriate choice of delivery model, faculty scepticism and dehumanisation of learning. Other reasons offered for failure include lack of opportunity for group-based learning, failure to support emotional growth by learners (Oerlemans et al., 2007), and concerns about reliability of technology and resources (Williams, 2006). While anecdotal evidence suggests that the reliability of the hardware and software platforms may be a major limiting factor, this issue is only referred to indirectly in the literature.

What are the characteristics of effective e-learning? Table 2.3 provides a summary of the requirements derived from a selection of the literature. A review of the literature reveals that few, if any, so-called DE or e-learning programs meet these requirements. Where a number of the requirements are met, it is reported that e-learning can result in more profound learning (Smith et al., 2001) with outcomes including: learners more willing to engage with peers and lecturers; learners more likely to challenge lecturers due to the protection of anonymity; greater engagement of learners as they are not able to sit quietly; quality of learner contributions more refined as they have more time to mull over concepts prior to posting (Smith et al., 2001); broader and deeper discussion (Smith et al., 2001; Abraham, 2007; Oerlemans et al., 2007); and greater motivation to learn (Abraham, 2007). Comparisons of similar cohorts have shown higher grades for e-learning delivery (Abraham, 2007; Lilje & Peat, 2007; Oerlemans et al., 2007). However, because a number of studies show that students benefit from the social interaction in face-to-face learning (Abraham,

2007), e-learning should be complementary to, rather than a replacement for, more traditional delivery methods.

Table 2.3: Requirements for effective e-learning

Infrastructure	Content and methodology	Delivery
<ul style="list-style-type: none"> • Support and active involvement of senior management and professorial staff (Davis & Hill, 2007) • University investment in establishing and maintaining hardware (Assogbavi, 2005; Guri-Rosenblit, 2005) • Student investment in hardware and appropriate level of internet access (Guri-Rosenblit, 2005) • Specialist programming and design expertise as an input in development (Smith et al., 2001; Turbill, 2002; Assogbavi, 2005; Davis & Hill, 2007; Oerlemans et al., 2007) • Resources allocated for development of content (Assogbavi, 2005; Davis & Hill, 2007) • Support for teachers to develop new skills and ongoing support structures for teachers and learners (Smith et al., 2001; Guri-Rosenblit, 2005) • Resources allocated for ongoing updating of material and for orienting new staff to the material and the technology (Davis & Hill, 2007) 	<ul style="list-style-type: none"> • E-learning embedded as a whole-of-curriculum approach (Davis & Hill, 2007) • Development of content underpinned by an articulated pedagogy (Williams, 2006; Davis & Hill, 2007) • Content specifically designed to suit online student-centred learning (not merely placing traditional materials online) (Abraham, 2007) • Direct interaction between learners and expert teachers (Guri-Rosenblit, 2005) • A range of teaching/learning strategies employed (Turbill, 2002; Assogbavi, 2005; Williams, 2006; Lilje & Peat, 2007) • Opportunities provided for discussion, testing and responding to others to enable students to formulate and articulate their personal theory and to explore implications for their professional practice to enable 'construction' of knowledge (Turbill, 2002) • Online communication resources supported by intensive residential periods and other modes of delivery (Guri-Rosenblit, 2005; Abraham, 2007; Davis & Hill, 2007) 	<ul style="list-style-type: none"> • Instructors log on to the course website 3-4 times per week for a number of hours (Smith et al., 2001) • Small student numbers (10-20) (Turbill, 2002; Guri-Rosenblit, 2005) • Exchanges include personal as well as professional contextualisation to support a community of learning (Turbill, 2002) • Support for weaker students (Guri-Rosenblit, 2005) • Online delivery is seen to be more suited to postgraduate education and undergraduate bachelor programs (Guri-Rosenblit, 2005)

2.2.4 Assessment

The purpose of assessment is two-fold: firstly, to ensure that learners have the knowledge and experience for professional practice; and, secondly, to motivate students to learn and encourage them to think about what they have learned, so as to improve this learning (Palmer, 2004; Parsons, 2007). This second objective is supported by others who maintain that students' learning is directed by assessment requirements (Knight, 2004; Palmer, 2004; Willey & Freeman, 2006; Parsons, 2007). However, because traditional forms of assessment tend to encourage surface rather than deep learning (Berglund in Palmer, 2004), an evaluation of assessment methods is important in considering factors supporting learning and teaching in OHS professional education.

Assessment may take one or more of many forms including closed-book examination, open-book examination, multiple-choice test, problem-based assignment and presentation (Le & Tam, 2007); other assessment methods include written portfolios, journals and multimedia outputs (Palmer, 2004). Self and peer assessments are becoming an important feature of group-based learning methodologies. When undergraduate engineering students were asked to rank various assessment methods in terms of impact on student attitude to learning and enhancing student understanding (Table 2.4), some of the differences in ranking were considered to be influenced by student preference and/or difficulty with certain methods such as presentations (Le & Tam, 2007).

Examinations tend to emphasise content. As they do not encourage reflection on past learning they are not useful in encouraging or assessing other graduate attributes. Also, examinations are seen to be biased toward certain types of students and cultural backgrounds (Parsons, 2007). Older learners (31+) find examinations less useful in promoting learning, preferring independent and individual study (Le & Tam, 2007). While open-book examinations are popular with students due to the reduced need for rote learning, this form of assessment is less popular with academics as question writing requires greater effort (Shine

et al. in Parsons, 2007). Knight (2004) uses the term Time Constrained Individual Assessment (TCIA) for a variety of activities that provide assessment that is reliable and resistant to cheating or plagiarism.

Table 2.4: Learners' perceptions of efficacy of assessment methods (adapted from Le & Tam, 2007)

Enhancement of student attitude*	Enhancement of student understanding*
Problem-based assignment/Open-book examination/ Multiple-choice test (all equal ranking)	Problem-based assignment Open-book examination
Open-book mid-semester test	Open-book mid semester test/Closed book final examination (equal ranking)
Closed-book mid-semester test	Closed-book mid semester test
Closed-book final examination	Multiple-choice test
Seminar	Seminar
Presentation	Presentation

*Assessment methods listed in decreasing ranked order

Problem-based learning assessment tasks have been rated by some learners as the most useful assessment method for enhancing student learning (Le & Tam, 2007). While the quality of entries varies, student journals are considered useful in assisting student learning (Le & Tam, 2007). Although many students find presentations a challenging mode of assessment, this method can play a major role in student learning and greatly improve communication skills (Le & Tam, 2007).

The assessment methods discussed above all assume an individual model for learning; problem-based, project-based and team-based learning (section 2.2.2) present different assessment issues. These issues have two aspects: what to assess and how to assess. These group-based learning methodologies are considered to foster deeper learning as well as professional competencies of

problem-solving, communication and interpersonal skills, collaboration and lifelong-learning, together with mastery of content with learning for understanding. If these competencies are important then they should be assessed (Cestone, Levine, & Lane, 2008). How?

One approach is to focus on group mastery of the learning objectives of the project/problem (Powell, 2004). This may be through reports and/or presentations. Interim reports such as 'milestone reports,' log books or work sheets may provide feedback on process; however, Powell (2004) warned that too much interim assessment may distract learners from the project objective. As learners develop their knowledge and skills, the final assessment may take the form of a professional discussion with a panel of industry members and specialists (Acar, 2004; Powell, 2004).

In the literature, assessment methods for professional and interpersonal skills focus on peer and self assessment with some input from tutors who observe groups of learners in action. Peer and group assessment is considered an essential component of the group-based learning methodologies in providing formative feedback for development of interpersonal and professional skills, and for mediating the outcomes of summative assessment (Willey & Freeman, 2006). Also, while tutors may have observed some group interaction, only group members possess sufficient information to accurately assess individual contributions (Levine in Cestone et al., 2008).

Self assessment is considered a valuable learning activity even in the absence of significant agreement between learner and tutor (Athanasou, 2005). However, several authors have acknowledged the potential for a self-bias where more-able students rate themselves lower than the group, while less-able students rate themselves higher (Willey & Freeman, 2006); also, there may be social, gender and cultural biases, with some groups underestimating their skills or displaying modesty (Athanasou, 2005). Furthermore, if implemented in a clumsy fashion, peer and self assessment can foster a highly competitive and destructive classroom environment (Levine in Cestone et al., 2008).

Some of the features of effective self and peer assessment identified in the literature are:

- Clear communication of the uses of peer and self assessment to learners and alignment with learners' expectations and values (Chen & Lou in Cestone et al., 2008).
- Provision of learner support and information in providing constructive feedback (Cestone et al., 2008; Sibley & Parmelee, 2008).
- Contribution by learners to development of assessment criteria and relative weighting (Willey & Freeman, 2006; Yost & Lane in Sibley & Parmelee, 2008). Typical criteria include cooperation, flexibility, dependability, attendance, attitude, respect for team members, preparedness, initiative, leadership, communication and decision making.
- Provision of periodic formative assessment without distracting learners from the main task (Cestone et al., 2008).
- Concerns about privacy of ratings are addressed (Willey & Freeman, 2006). (Willey and Freeman reported on a confidential online tool for collecting and collating learner and peer ratings for formative feedback and mediating summative assessment.)

A European Society for Engineering Education working group developed a list of characteristics for 'fair' assessment that could be applied to OHS professional education:

open/transparent/predictable criteria; related to genuine learning achievement; gives feedback/encouraging/guiding learning; reliable; accurate, unbiased, objective; relevant and appropriate to content/level/objectives; comparable to previous/consistent; adheres to rules – punishes plagiarism but has an appeals process; continuous/timely; accounts for mitigating circumstances and special cases; reviewed and changeable – so that improvement is possible (Vos in Palmer, 2004).

Selection of assessment methods will be influenced by whether formative or summative assessment is required. The objective of formative assessment is to support the development of students' understanding or skills; it includes qualitative feedback (Parsons, 2007). As students tend to direct their learning according to where marks are allocated, formative assessment should carry greater weighting to encourage learning, with passing the summative examination being a 'hurdle' requirement (Parsons, 2007). Alternatively, the 'hurdle' may be that learners are not allowed to sit summative assessments unless formative assessments have been satisfactorily completed (Knight, 2004). While there is still need for summative assessment in professional education, effective learning is invigorated by good formative assessment which encourages the perception of assessment as a conversation rather than decree (Knight, 2004).

In practice, selection of assessment methods is usually a compromise between relevance to the learning outcomes being assessed, financial costs and limiting the possibility of plagiarism (Palmer, 2004). Different sorts of assessment are needed for different learning outcomes (Knight, 2004; Cestone et al., 2008). Most literature on assessment focuses on undergraduate programs with little reference to postgraduate programs where the student profile and nature of the learning outcome are different. Not only is there a paucity of literature on assessment methods in OHS professional education but, as most OHS professional education is at the postgraduate level, there are few exemplars to inform development in this area. This gap may be impacting on learning outcomes in OHS professional education as it is likely that OHS educators are in a similar position to that recognised by Burtner (in Palmer, 2004) for engineering educators, in that they are not necessarily experts in education theory, including assessment of learning.

2.2.5 Learners in OHS professional education

As noted in section 2.1.4, there are several potential levels of entry to OHS education, including Certificate IV, Diploma/Advanced Diploma, and undergraduate and postgraduate degrees. OHS professional education is

generally accepted as that which occurs in universities; this may be a bachelor degree in OHS, but more often is a postgraduate qualification with the majority of learners in OHS professional education being mature-age students. Kinnaird (2008) reported that in 2005, 71% of Australian OHS tertiary students were undertaking postgraduate qualifications; of these, 73% were aged over 30 (including 40% over 40 and 10% over 49). Of the undergraduate students, 38% were aged over 30 years.

Pryor (2004) postulated that this student profile may impact on the nature of learning and educational outcomes, particularly those related to critical and analytical thinking and lifelong learning. Postgraduate OHS students usually pay full fees, see themselves as buying a service and demand 'quality.' The student perception of a quality service includes access to technology, availability of staff and resources at times to suit them and, more importantly, information and materials provided to them rather than having to search and access themselves. The availability of large amounts of information through the internet and OHS regulators contributes to the simplistic view that the answers are available at the touch of a button. Some OHS educators report that the opportunity to think, challenge and explore in order to arrive at their own concepts and models appears to be devalued in favour of the quick answer. For some students, the destination of the qualification appears to be more important than the journey of education (Pryor, 2004). Research has begun to explore the impact of work/study balance, and issues relating to engagement and retention of OHS students in the contemporary higher education environment; further work is required in this area (Joubert & Toft, 2006; Toft et al., 2006).

2.3 The OHS 'academy'

In 1995, Quinlan observed that the Australian 'academy' of OHS teaching and learning was threatened by a lack of available qualified staff and small centres of OHS education. While the causative factors may have changed, this threat remains today.

Universities generally require a doctoral degree for academic lecturing staff, yet feedback from students is that an effective OHS educator also requires practical experience to be relevant to student needs. Thus the requirements of effective OHS educators are technical knowledge and expertise, demonstrated ability to apply this knowledge and an understanding of educational principles. Within the university environment, it appears that only one of these requirements, technical knowledge, is especially valued (Pryor, 2004). A similar situation is reported for engineering where university promotion systems reward research activities rather than practical experience or teaching expertise (Mills & Treagust, 2003).

Pryor (2004) proposed that the ideal OHS educator would have a high level of knowledge; considerable experience, either broadly-based or in a specialty area; and be able to move between industry and OHS academia. However, the university salary structure is designed for a lifetime career in academia. OHS course coordinators report significant difficulty in obtaining 'suitably qualified' and experienced staff. Not only are there few holders of doctoral degrees in OHS-related areas, those who are 'qualified' can earn significantly higher salaries in industry. At all levels, the recruitment field within Australia for any OHS academic position is extremely small.

In 2004, Pryor (2004) found that numbers of academic staff in the various Australian OHS education centres ranged from 1.2 to 8 with a median of 3.5 plus sessional staff. These small numbers create issues of inadequate 'critical mass' required for a reasonable range of expertise, intellectual support and exchange between staff, and back up for staff absence or leave. Also, difficulties related to pay scales and other factors are encountered when sourcing well-qualified sessional staff (Pryor, 2004); this inconsistent availability of sessional staff adds another layer of complexity and challenge in the delivery of quality OHS educational outcomes (Keleher, Toft, Joubert, & Howard, 2006). Perhaps the small centres and difficulty in obtaining appropriately qualified educators can be attributed to the existence of too many Australian providers of OHS professional education, in which case the consortium-based delivery model for the Masters of Public Health may prove applicable for OHS education (Pryor, 2004).

2.4 Summary

The OHS support role has existed in the workplace for more than 50 years, evolving from a technical/trades role into professional provision of advice to managers on how to meet their practical, legal and moral obligations in preventing workplace injury and ill-health. Section 2.1 established that the scope and depth of the role of the generalist OHS professional is not well recognised by OHS policy makers, regulators and the community. The development of the profession and OHS professional education have been inhibited by the multidisciplinary/transdisciplinary nature of the role, the lack of a defined core body of knowledge, and the unregulated nature of entry to the profession. Also, these issues have combined to hinder attempts to develop a process for external accreditation of OHS professional education programs.

A proposed strategy to be funded by WorkSafe Victoria should assist in defining the core body of knowledge, developing criteria and process for course accreditation, and clarifying the role of the generalist OHS professional. These outcomes will enhance the integrity of the profession; however, further work will be required by OHS professional bodies, educational institutions and OHS regulators to promote the benefits of qualified OHS advice to the workplace and to bolster community recognition of OHS as a profession.

Section 2.2 reviewed a selection of the literature on teaching, learning and assessment strategies supporting learning in professional education. As engineering and medical education share some discipline similarities with OHS, there was a focus on relevant literature in these fields. Building on a constructivist theory of learning, where learning is a social and reflective process, the methodologies of problem-based learning, project-based learning and team-based learning were discussed. These methodologies offer advantages in promoting a student-focused approach, significantly enhancing learners' engagement with the content and development of professional and interpersonal skills. However, there are some concerns regarding the depth of

technical knowledge attained via these methodologies, and resourcing issues particularly for problem-based learning. Scope exists for investigation of how to integrate the best of each methodology, and the most appropriate mix of methodologies, to achieve the full range of required graduate attributes.

Mode of delivery needs to be acknowledged as an integral part of the learning approach. Off-campus delivery is a major feature of OHS professional education in Australia. Traditional distance education based on print materials is deemed inappropriate for developing professional-level knowledge and skills for the OHS professional. E-learning, especially where combined with face-to-face learner-learner and learner-instructor interaction, can result in high-level learner engagement with subject matter as well as with the learning group. However, there are a number of requirements for optimising the benefits of e-learning and few programs meet even a majority of these.

Section 2.2 revealed a dearth of relevant research defining and evaluating educational strategies in OHS professional education. This may be due to a lack of expertise in educational theory among OHS educators or, as explained in section 2.3, it may be related to the OHS 'academy' being characterised by small centres of teaching with resultant pressures on staff. Within universities, a lack of recognition of OHS as a discipline, and the prevalence of staff promotion strategies that under-value practical experience and teaching expertise, are potential threats to the sustainability of the academy.

While examination of the literature on learning and assessment methodologies in education for related professions such as medicine and engineering can inform OHS education, research is required to confirm such transferability. To some extent OHS professional education is unique in that entry-level is predominantly postgraduate; consequently, there is little directly relevant educational literature available.

This review has raised several questions requiring structured research to inform OHS professional education:

- Can OHS educators benefit from the experience of medical and engineering education in developing learning strategies based on the social and reflective model of learning that combines the best features of problem-based learning, project-based learning and team-based learning within realistic resourcing parameters?
- What are the most appropriate teaching and learning strategies for OHS professional education? Are these strategies, or is the relative balance of strategies, different for undergraduate and postgraduate OHS professional education?
- How can the practical needs of mature-age and geographically isolated learners be met within a social-reflective model of learning? How can the development of critical and analytical thinking skills, together with professional, interpersonal and organisational skills be facilitated for such learners? Can e-learning facilitate the development of such skills in the OHS professional where there is little opportunity for face-to-face learning experiences? Given that some OHS professional education programs have no face-to-face learning component, can such programs develop the full range of required graduate attributes?
- Viewing assessment as a driver of student learning, what are the most appropriate assessment methods to support student learning of technical content as well as professional and interpersonal skills? Are these assessment methods different for undergraduate and postgraduate learning?
- If assessment should qualify people for professional practice, what assessment methodologies provide adequate reliable information?

The WorkSafe Victoria strategy to develop and implement a core body of knowledge for the generalist OHS professional will significantly advance OHS professional education by clarifying required graduate attributes and core knowledge content. Further work will be required by the OHS educational

institutions and the Safety Institute of Australia to ensure that the outcomes of this project are implemented and embedded in OHS professional education. However, this leaves the questions on OHS teaching, learning and assessment unanswered.

One of the outcomes of the 1994 OHS educators' conference was identification of the need for a network to foster discussion on OHS professional education (Quinlan, 1995). As a result, the Australasian Association of OHS Educators was formed and remained active for several years. Following a period of dormancy, the Association became the OHS Educators' Chapter of the Safety Institute of Australia. The issues raised in this literature review indicate the need to revitalise this network as a 'community of practice' (Wenger, 1998) to encourage and facilitate discussion and research on OHS professional education.

3. METHODOLOGY

This section provides a detailed account of the project methodology and the data collection and analysis techniques employed to meet the project objectives outlined in section 1.2.

3.1 Investigation strategy

As a project taking first steps toward optimisation of OHS education for Australian OHS professional practice, *Safeguarding Australians* required an extensive consultation process to capture the voices of several stakeholder groups. Action research, a methodology often used ‘autoethnographically’ (Herr & Anderson, 2005) by investigators researching their own practice, provided the necessary opportunity for self-reflection and responsiveness. Carr and Kemmis (1986) explained:

The methodology of action research is a cyclic form of self-reflective inquiry. It is used in social situations by the participants, to improve their own practice and the understanding of their practice and the situation.

In a cyclic process of problem definition, action research involves enacting a potential solution, observing the impact of that action, reflecting on the outcome and then repeating the cycle. Based on a preliminary literature review, quantitative and qualitative survey instruments were designed and tested in a cyclic multi-phase process of data collection and analysis. After each research activity, members of the project team met to reflect on the effectiveness of these instruments and to finetune as required. In this manner, the investigation strategy was designed to:

1. Explore the problem space
2. Identify and engage key stakeholders
3. Confirm a common and transparent language that assists in developing a common understanding of core issues to be explored

4. Distil the views of key stakeholders in terms of current strengths, challenges and gaps in the expectation and delivery of core learning outcomes required of professional OHS graduates
5. Analyse the findings to inform a process of validation by stakeholders and further consultations
6. Facilitate a workshop focused on systematic, sustainable and future-orientated action
7. Evaluate the efficacy and learning from the project

Full exploration of the problem space involved a qualitative/quantitative approach with a multi-phase process of primary data collection to enable data triangulation. Combined with the action research cycles, this strategy provided the holistic approach necessary to accommodate diverse stakeholder needs and the project team members' stakeholder bias.

3.2 Key stakeholder groups

Five groups of key stakeholders were identified:

- *Professionals* – people working in OHS, identified as such by their membership of the key OHS professional body, the Safety Institute of Australia.
- *Regulators* – people involved in regulation of OHS at national or state level, identified via the Australian Safety and Compensation Council, and state jurisdictional bodies.
- *Educators* – university educators in the OHS discipline, identified by a search of websites of all universities offering OHS programs, and through personal contacts of project team members. It is important to note that all team members were included in this group.
- *Registered Training Organisations (RTOs)* – people who represent organisations that offer the following OHS qualifications: Certificate IV in Occupational Health and Safety, Diploma in Occupational Health and Safety, and/or Advanced Diploma in Occupational Health and Safety. This group was identified from the National Training Information Service website (www.ntis.gov.au).

- *Graduates* – people who had completed a university degree in OHS or related field. Due to privacy and ethical considerations, graduates were identified through current university staff members who could contact their alumni.

Membership of these stakeholder groups was not mutually exclusive.

3.3 Data collection

Data collection strategies were designed to explore three major themes – supporting the integrity of the profession, supporting student learning and supporting the OHS academy. Each theme suggested avenues of inquiry, including:

Supporting the integrity of the profession

- What is the most appropriate entry-level qualification for an OHS professional?
- What knowledge, skills and attributes are required of an OHS professional?
- What are the critical core OHS learning outcomes?
- How can the transdisciplinary nature of OHS professional practice be supported?

Supporting student learning

- How can the scholarship of OHS learning and teaching be supported and enhanced?
- What are appropriate curriculum models for delivering desired OHS learning outcomes?
- What assessment models and methods are appropriate for each qualification level?
- What are the ideal graduate characteristics for each qualification level?

Supporting the OHS academy

- What is the ideal scholarship-practice nexus for an OHS teaching team?
- What are the appropriate qualifications and experience levels for OHS educators?
- Does an OHS 'community of practice' exist? How can such a community be facilitated?
- How can we build human resource capacity to ensure enhancement and continuity of the OHS academy?

To ensure data collection methods adequately and accurately reflected the ideas of the OHS community, survey instruments developed by the project team were sent to members of a stakeholder reference group for validation.

Between March 2008 and April 2009, focus groups, survey questionnaires, in-depth telephone interviews and a workshop were conducted to gather information from stakeholders. The stakeholder groups targeted by each data collection method are detailed in Table 3.1.

Table 3.1: Participants involved in each data collection activity

Data collection activity	Professionals (n)	Regulators (n)	Educators (n)	RTOs (n)	Graduates (n)	Total (N)
Questionnaires	420	-	22	31	21	494
Focus groups	28	16	25	-	-	69
Interviews	-	-	15	-	-	15
Workshop	-	4	22	-	-	26

Focus group and interview/survey methods were approved by the Human Research Ethics Committee (HREC) of Central Queensland University (HREC Approval Numbers H08/06-026 and H08/07-036, respectively).

3.3.1 Focus groups

A total of 12 focus group discussions were held to coincide with Safety Institute of Australia state conferences in Western Australia, Victoria, New South Wales and Queensland. At each site, a focus group discussion was held for each of three stakeholder groups – OHS professionals, regulators and educators; the number of participants ranged from 3 to 14 (Table 3.2). Focus groups comprised those stakeholders who accepted an emailed invitation to participate (Appendix 2). Each focus group discussion, facilitated by a member of the project team, was audio-taped and lasted approximately 2 hours. Questions were tailored to the groups' stakeholder type (Appendix 3)

Table 3.2: Number of participants at each focus group

State	Professional focus group (n)	Educator focus group (n)	Regulator focus group (n)
Western Australia	4	5	3
Victoria	14	11	3
New South Wales	5	5	5
Queensland	5	4	7

3.3.2 Questionnaires

To collect demographic data and information and opinions relevant to the education of generalist OHS professionals, a survey of key stakeholders – OHS professionals, educators, RTOs and graduates – was undertaken. Regulators, as a group, were not included in this survey; however, if individual regulator representatives were Safety Institute of Australia members, they received a questionnaire targeting professionals. Targeted stakeholder groups were contacted via email; educators and RTO representatives received a personalised email while professionals received an email via the Safety Institute of Australia mailing list. Because direct contact with graduates was not possible, information about the study and an invitation for graduate participation was sent to OHS educators with the request that it be forwarded to their alumni.

Participants had the option of completing a web-based electronic questionnaire or a formatted Microsoft Word version via email. The web-based surveys were developed and hosted with the online survey provider Zoomerang (www.zoomerang.com).

Questionnaires, tailored to each stakeholder group, elicited views on what constitutes a competent generalist OHS professional, what OHS education should entail at different qualification levels, and what qualifications and experience levels are appropriate for OHS university educators (Appendix 4). In addition, educators were questioned about the existence of an OHS ‘community of practice’ and factors that influence recruitment and retention of OHS

educators; professionals were asked to identify areas covered well by university OHS courses and areas with potential for improvement; and graduates were asked to comment on the usefulness of various OHS content areas and teaching methods.

Response rates for the four stakeholder groups surveyed are presented in Table 3.3. A potential contributing factor to the low response rate from professionals was that they did not receive personalised invitations to participate. A response rate for graduates could not be determined due to the manner in which the survey was deployed which resulted in an unknown number of potential participants. Considering the survey invitation was sent to 48 educators to forward to their graduate contacts and only 21 surveys were returned, the response was limited. Some reasons for this may include a) that university educators did not forward the survey invitation, b) that the survey failed to reach the graduates due to incorrect contact details, and/or c) graduates did not receive personalised invitations.

Demographics of the stakeholders who completed the questionnaire are detailed in Table 3.4.

Table 3.3: Survey response rates for OHS stakeholder groups

OHS Stakeholder group	Invited to participate (n)	Completed questionnaire (n)	Response rate (%)
Professionals	2461	420	17
Educators	51	22	43
RTOs	102	31	30
Graduates	unknown	21	unknown

Table 3.4: Survey participant demographics

	Professionals	Educators	RTOs	Graduates
Gender	No. (%)*	No. (%)	No. (%)	No. (%)
Male	283 (67)	11 (50)	23 (72)	7 (33)
Female	133 (32)	11 (50)	9 (28)	14 (67)
Age				
Range (years)	21–73	28–66	34–65	20–55
Mean (\pm SD)	47.2 (10.4)	50.7 (9.2)	61 (7.0)	36.6 (9.8)
Education level	No. (%)*	No. (%)	No. (%)*	No. (%)*
PhD	6 (1)	10 (45)	0	0
Other postgraduate	143 (34)	11 (50)	10 (31)	7 (33)
Undergraduate	107 (26)	0	7 (22)	12 (57)
Vocational	155 (37)	1 (5)	14 (44)	0
Time worked in OHS				
Range (years)	1–48	2–35	1–30	0–22
Mean (\pm SD)	13.8 (8.7)	18.8 (9.9)	15.2 (9.7)	5.9 (5.3)
Location	No. (%)*	No. (%)*	No. (%)*	No. (%)*
NSW/ACT	116 (28)	5 (23)	6 (19)	8 (38)
Victoria	127 (30)	5 (23)	5 (16)	0
Queensland	67 (16)	6 (27)	3 (9)	10 (48)
South Australia	31 (7)	2 (9)	2 (6)	0
Western Australia	46 (11)	3 (14)	14 (44)	0
Tasmania	4 (1)	0	1 (3)	0
Northern Territory	0	0	0	0
No. participants	420	22	32	21

*% does not total 100% because the corresponding question was not answered by all respondents

3.3.3 Interviews

To gain specific detailed information about OHS programs in Australian universities, structured in-depth telephone interviews were conducted with 15 OHS educators. Interviewees were identified from the OHS educator stakeholder group as the people primarily responsible for the OHS program at their respective university. While interviewees may also have completed questionnaires, this cannot be confirmed as questionnaires were de-identified for ethical reasons. Interview questions are outlined in Appendix 5. The duration of interviews ranged from 15–45 minutes. Notes were taken and interviews were audio-taped.

3.3.4 Workshop

In April 2009, informed by results of the focus groups, surveys and interviews, a workshop – known as the ALTC OHS Educators' Workshop – was conducted based on principles of:

- inclusiveness and diversity;
- long-term change (sustainable future-oriented outcomes);
- collaboration (genuine engagement, consultation and validation); and
- excellence (in development of a posture of learning for continuous improvement into the future)

Held at Central Queensland University's Sydney campus, the workshop was attended by a total of 26 educator and regulator stakeholders, who accepted the invitation to participate sent via email to all members of these stakeholder groups. At the workshop, participants were informed of the results of focus groups, surveys and interviews in four themed sessions: Identifying Strengths, Challenges and Gaps; Sustainability; Mapping Disciplines; and Community of Practice (Appendix 6). Within small groups facilitated by project team members, participants discussed project results, validated findings and considered evidence-based opportunities for improvement of OHS professional practice.

3.4 Data analysis

The mixed methodology and cyclic nature of data collection, refinement and reflection, stipulated ongoing analysis and interpretation. Thematic analysis was conducted on transcribed focus group data, with the first focus group analysed prior to the second and so on to inform the process of validation by stakeholders. Interview and workshop data were also analysed thematically, while survey responses were analysed using SPSS.

3.5 Summary

The investigation strategy of *Safeguarding Australians* was geared to facilitating extensive consultation with OHS professional, regulator, educator, RTO and graduate stakeholders. Action research methodology allowed a cyclic multi-phase process of data collection and analysis, with ongoing refinement of survey instruments. Various combinations of stakeholder groups were included in focus group discussions, surveys and telephone interviews. Finally, results were disseminated at an ALTC OHS Educators' Workshop and stakeholders were empowered to take ownership of project outcomes.

4. CONTENT AND DELIVERY OF OHS TERTIARY EDUCATION

This section explores the disciplinary underpinning of OHS tertiary education, and stakeholder expectations of the learning outcomes and underpinning curricula required for OHS professional competency.

4.1 Disciplinary underpinning

Survey questions and focus group discussions explored the opinions held by key stakeholders regarding the knowledge base required for a generalist OHS professional. Survey respondents were asked to rank four discipline areas in order of importance to an OHS professional's knowledge base (Table 4.1). The results reveal disparity between the educators' rankings and other groups surveyed; while educators ranked 'science' followed by 'health' as most important, the other groups ranked 'management' and 'behavioural' as most important.

Table 4.1: Required knowledge base for a generalist OHS professional

Knowledge base	Educator rank (mean)	Professional rank (mean)	Graduate rank (mean)	RTO rank (mean)
Science	1 (2.05)	3 (2.54)	4 (2.90)	4 (3.10)
Health	2 (2.10)	4 (3.00)	3 (2.76)	3 (2.28)
Management	3 (2.24)	1 (2.21)	2 (2.57)	1 (2.06)
Behavioural	4 (3.33)	2 (2.45)	1 (1.52)	2 (2.18)

Focus group discussions revealed less discrepancy between the perspectives of educators and professionals in terms of knowledge-base requirements than did the survey responses. A common theme from all of the focus groups was that a broad knowledge base was required. Comments from the focus groups of OHS professionals included:

I think the whole practice is a mix.

Health's an emerging issue.

General science, specific sciences like chemistry and engineering and industrial engineering.

Physiology, anatomy...got to understand the body.

I did a business degree and I was able to bring all those skills along with me.

The educator focus groups featured considerable discussion of the multidisciplinary nature of current degrees as a manifestation of the move away from a more limited, but clearly defined traditional knowledge base such as that suggested by Table 4.1. One educator with a Bachelor of Applied Science in Environmental Health was uncertain whether he would classify his degree as health or science; another with a Bachelor of Science with a major in vertebrate physiology and sub-majors in psychology and statistics considers hers to be both science and behavioural science.

In the regulator focus groups, a wide variety of views regarding the ideal knowledge base for generalist OHS professionals were expressed, with responses ranging from “*background doesn't matter*” to a “*broad spectrum generalist knowledge of everything.*” Responses regarding discipline background included:

I firmly believe its got to have a foundation of sciences, behavioural sciences, health sciences.

You need to understand the justice system...the schemes that we're in such as compensation and the OHS legislative framework.

If you think of it a bit more holistically... perhaps behavioural sciences.

I always see it sitting with business...it's all about the business environment.

I have no law background, ergo background, chemistry background, medical background, but that doesn't mean you can't be an effective OHS practitioner.

4.1.2 Subject areas

In the interviews with educators, information was obtained about subject areas covered in university degree programs. The subject areas (presented in Table 4.2) represent the curriculum content of seven undergraduate programs (of these, one has ceased, one is only offered offshore and another will commence in 2010) and nine postgraduate programs (exclusive of research-only programs). These subject areas do not necessarily represent individual teaching units within a program as it is common for subject areas to be combined within a single unit.

In addition to the subject areas listed in the questionnaire, other areas identified as components of undergraduate OHS programs included Health Science Communication, Food Safety, Microbiology, Sociology of Health and Work, Human Movement, Introduction to OHS, Health Promotion, Professional Practice, Emerging Issues and Organisational Culture. At the postgraduate level there are not as many other subject areas, but they are equally diverse, including Public Health, Developing Professional Practice, Managing for Sustainable Development, Auditing, and Organisational Change and Leadership. It is clear from Table 4.2 that undergraduate programs cover subjects from all of the discipline areas previously discussed as well as OHS subject areas that cannot be categorised easily into any one traditional discipline. Postgraduate programs, on the other hand, tend to concentrate on OHS subject areas rather than generalist discipline subjects. This difference is one that would be expected in traditional tertiary education pathways; the undergraduate degree provides foundation knowledge within or across disciplines which underpins the OHS subject areas, whereas the postgraduate degree builds upon and deepens the OHS knowledge and deals with specialist areas.

In reality this assumption that OHS education follows a traditional tertiary education pathway is unfounded. The declining number of undergraduate programs and the increasing demand by experienced but non-credentialed

Table 4.2: Subject areas covered in Australian undergraduate and postgraduate OHS programs

Subject area	UG programs No. (%)	PG programs No. (%)
Risk Management	7 (100)	8 (89)
Accident Investigation	7 (100)	7 (78)
OHS Law	7 (100)	6 (67)
Ergonomics/Human Factors	7 (100)	4 (44)
Human Physiology	7 (100)	3 (33)
Occupational Health	6 (86)	6 (67)
Occupational Hygiene	6 (86)	6 (67)
Statistics	6 (86)	5 (56)
Toxicology	6 (86)	5 (56)
Research Methods	6 (86)	3 (33)
Human Anatomy	6 (86)	2 (22)
Practicum	6 (86)	2 (22)
OHS Management Systems	5 (71)	8 (89)
Organisational Behaviour	5 (71)	5 (56)
Rehabilitation & Compensation	5 (71)	4 (44)
Emergency Management	5 (71)	3 (33)
Chemistry	5 (71)	1 (11)
Physics	5 (71)	1 (11)
Epidemiology	4 (57)	5 (56)
Industrial Relations	4 (57)	5 (56)
Safety Science	4 (57)	5 (56)
Psychology	4 (57)	2 (22)
Environmental Studies	4 (57)	1 (11)
Biology	4 (57)	0
Management	3 (43)	3 (33)
Project	3 (43)	3 (33)
Environmental Health	3 (43)	2 (22)
Human Resource Management	3 (43)	2 (22)
Mathematics	3 (43)	0
Training & Development	3 (43)	0

OHS practitioners for tertiary-level OHS education has led to OHS postgraduate programs increasingly becoming the de facto entry level qualification. Consequently, many postgraduate students do not have the foundation knowledge required for postgraduate study. This issue was discussed extensively in the focus groups. One educator remarked:

There is a need for people out there doing the [OHS] job to get training, but there's always that bit of a dilemma with the postgraduate...they've kind of missed out on building those skills that make a graduate a graduate and which are essential for OHS practice. The problem is that with undergraduates we've got 24 courses to explain [the underpinning theory]; at postgraduate you've got 6 courses, we don't have enough time to go back and explain all this underpinning theory.

Another issue that impacts on postgraduate education is that even if a student does have an undergraduate degree it is unlikely to be in the OHS area. For some educators this was not seen as a problem, for example:

I don't think the old idea of the postgrad being one rung up on the management of the undergrad is really what we do any more with a lot of our postgraduate programs. So far as I can see the postgraduate content of our OHS program is really aimed at people who haven't done OHS at an undergraduate level but they've got graduate skills [and] need to turn themselves into an OHS person...The kinds of materials that are covered are actually similar but there's more attention to things like communication skills, problem-based learning in the undergraduate program because you've got the time to build it whereas you're assuming with the postgraduate that they've got a graduate way of behaving and of finding information and using it.

However, others did perceive it as problematic. For example:

You can't assume that someone who comes in with a psychology degree really understands the chemistry that is the basis of hygiene.

4.2 Stakeholder expectations about learning outcomes and underpinning curricula

As previously stated, the teaching of both undergraduate and postgraduate OHS programs in Australian universities is not unified and there are no industry or professional association requirements for core learning outcomes. Section 4.1 has established that there is some commonality of content across universities' undergraduate and postgraduate OHS programs, but little consensus among stakeholders concerning the knowledge base required for OHS education. This section examines stakeholders' ideas about what constitutes competency for generalist OHS professionals. It also examines respondents' views on the education level appropriate for a generalist OHS professional, the relative importance of experience versus formal learning, and current methods of curriculum delivery and assessment.

4.2.1 Generalist OHS professional competency

One survey question asked respondents what they expected a competent generalist OHS professional to be able to do in their professional capacity. Respondents were asked to select from a list of competency areas provided and/or, if preferred, specify other areas. It can be seen from Table 4.3 that there was agreement among stakeholder groups about the five most essential competencies – 'OHS management systems,' 'OHS law,' 'risk management,' 'accident investigation' and 'OHS auditing' – with more than 87% of respondents in each group nominating these as required areas of competency. Interestingly, with the exception of 'OHS auditing,' these are subject areas currently taught in the undergraduate programs of all universities.

One major area of discrepancy was 'safety science,' which 81% of educators nominated as an expected area of OHS professional competency compared with only 56% of professionals, 48% of graduates and 38% of RTOs. A possible explanation for this discrepancy is that 'safety science' is a term educators are more familiar with; outside the tertiary sector, the term 'safety management'

may be more commonly applied with 'safety science' perceived as relating to the theory rather than the practice of safety. This explanation highlights the lack of a shared OHS nomenclature, a problem encountered throughout this project.

Other areas of discrepancy between educators and the other stakeholder groups were 'health promotion,' 'wellness' and 'rehabilitation.' While all three areas were generally perceived as relatively less important, educators found them considerably less important than the other groups. This raises the question of whether OHS educators as a group hold a different perspective about the safety versus health divide and whether the source of the revealed percentage differences can be traced to differences in work environments between academia and industry.

Table 4.3: Expectations of what a competent OHS professional should be able to do

Area of competency	Educators (%)	Professionals (%)	Graduates (%)	RTOs (%)
OHS management systems	100	97	100	100
OHS law	100	94	95	100
Risk management	91	98	100	100
Accident investigation	91	96	95	97
OHS auditing	91	88	91	91
Safety science	81	58	48	38
Occupational health	71	67	76	88
Emergency management	71	77	81	84
Organisational behaviour	71	66	86	56
Occupational hygiene	57	45	71	56
Ergonomics	57	68	71	63
Health promotion	43	60	57	59
Wellness	24	40	57	47
Rehabilitation	19	48	52	56

After nominating general areas of expected competency, survey respondents were asked what skills and attributes competent generalist OHS professionals should have. Respondents were asked to select from a list of skills and knowledge attributes provided and/or, if preferred, to specify other skills or attributes. Additional skills and knowledge attributes suggested by respondents included training and presentation, critical thinking, change management, negotiation and people management. A large majority of respondents from all groups considered all the nominated skills and knowledge attributes necessary for generalist OHS competency (Table 4.4). Indeed, educators were unanimous in identifying all specified skills as required; this may have as much to say about their perceptions of graduate attributes as it does about their perceptions of what OHS professionals need. 'Knowledge' responses were reasonably consistent between the groups with the exception of 'ethics and social issues;' considerably fewer OHS professionals considered this an essential attribute. Ethical behaviour of OHS professionals was a topic discussed in the educators' focus groups but not raised in any of the professionals' focus groups. One educator commented:

Ethics is really important, so is social justice...Because there's a lot of ethical decisions to make in OHS, [professionals] need to have a strong basic understanding of what ethics is and how it should be integrated into what they do on a daily basis.

The knowledge attribute considered least important in the survey was 'research methodology.' Interestingly, professionals and educators in focus groups identified the importance of skills and knowledge requirements for investigating and researching workplace problems, as well as for developing interventions and programs for managing these problems. For example, one OHS professional stated:

One of the things we do need is evaluation, so people do an intervention and they need to know how to set up the intervention in a reasonably scientific manner and then be able to assess and evaluate the intervention.

Table 4.4: Skills and knowledge attributes required by a competent generalist OHS professional

Skills and knowledge	Educators (%)	Professionals (%)	Graduates (%)	RTOs (%)
Skills				
Oral communication	100	100	100	97
Written communication	100	98	91	100
Problem solving	100	97	95	91
Computer skills	100	96	100	88
Team work	100	92	100	88
Information retrieval	100	88	86	84
Knowledge				
OHS concepts/models/theories	100	97	100	97
Ethics and social issues	91	78	86	84
Research methodology	73	70	67	72

In the focus groups, educators, professionals and regulators were asked ‘What do you expect a competent OHS professional to be able to do?’ Educators frequently took a very broad perspective of what they expected OHS professionals to be able to do. For example:

...be effective in incident investigation to advise management on minimum levels; how to comply with legislative requirements and at a higher level one should be able to do at least a limited amount of research in safety and health and communicate effectively with the professionals from other areas in the organisation or, in other words, make use of knowledge and experience of engineers, chemists, scientists, managers and so on... To be able to command the respect of engineers, chemists, stock managers, one would probably need not only very good inter-personal skills, but show at a least a basic understanding of some disciplines.

[There’s] a whole range of things they should know, for instance, if they are dealing with noise, there’s a certain fundamental bank of knowledge about that noise; manual handling – they should have an understanding of certain types of things. Certainly the risk management approach has got to underpin their core set of skills to begin with, then having the ability to analyse their organisation, identify their hazards and put forward programs to control that, to do statistical reporting, to look at trend analysis, there’s a whole range of things – it can go on ad infinitum.

Professionals tended to focus on broader job tasks rather than on specific areas of competency. For example:

...interpret relevant Acts and Standards...and also how to give appropriate and correct advice and how to then source good advice if they weren't in a position to know at the time.

There was considerable blurring between areas of competency, and the knowledge and skills required as the discussion dealt with this question in a holistic way. For example:

They've got to be able to critically evaluate the information they're getting...so often it's contradictory. They've often got to take information and forecast what that could mean in particular situations, so they've got to be able to look critically at exposures. They've got to be able to advise, to adapt advice to situations, so it's not just critically evaluating information that's coming but also being able to take that information and package to suit the audience and the circumstances because communication is an important part of that.

...strategic thinking, ability to drive change leadership in OHS...communication's got to be one of the foundation stones ...able to communicate at all levels.

Regulators from all four States represented agreed that OHS professionals needed to be competent in the areas of OHS law and risk management, but did not reach consensus on any other areas of competency. However, most considered generic skills such as communication and negotiation to be crucial. One of the regulators stated:

I think different aspects of business require different skill sets for them to achieve good health and safety outcomes...I think the critical skill that any OHS professional needs is the ability to negotiate and consult...if they haven't got those it doesn't matter how good their technical skills are.

4.2.2 Curriculum content

The survey questionnaire asked respondents what OHS content areas should be taught at undergraduate and postgraduate levels. OHS professional,

educator and graduate responses received regarding undergraduate and postgraduate programs, summarised in Table 4.5, indicate that there is no clear consensus among these stakeholder groups about the relative importance of discipline content that might be included in an OHS curriculum. For undergraduate programs, six content areas were favoured by 80% or more of the respondents from each group. These areas were:

- Ergonomics
- OHS law
- Risk management
- OHS management systems
- Accident investigation
- OHS auditing

Only three-quarters of each stakeholder group nominated 'occupational health' as a content area that should be covered; furthermore, health-related areas such as 'health promotion,' 'rehabilitation' and 'wellness' were all nominated by fewer respondents. The content area of 'safety science' was also considered generally less important, with 83% of professionals indicating it was required compared to 70% of the other two groups.

An even more pronounced lack of consensus characterised expectations for OHS content areas for postgraduate programs. There were no content areas considered necessary by 80% or more of the respondents from each group. The most prominent difference was between OHS professionals and the other two stakeholder groups. Only two content areas were identified as necessary by more than 80% of professionals: 'safety science' and 'organisational behaviour'. However, three content areas were considered appropriate for postgraduate programs by 79% or more of respondents from each group:

- Risk management
- OHS law
- Occupational hygiene

Table 4.5: OHS content areas that should be covered in undergraduate and postgraduate programs

Content area	Undergraduate			Postgraduate		
	Educators %	Professionals %	Graduates %	Educators %	Professionals %	Graduates %
Ergonomics	91	82	81	77	71	81
OHS law	86	89	100	82	79	86
Risk management	86	87	95	82	79	95
OHS management systems	86	86	86	86	76	90
Accident investigation	82	83	100	82	67	71
OHS auditing	82	80	86	73	69	76
Occupational health	77	76	71	82	70	76
Emergency management	73	78	86	73	63	76
Safety science	68	83	62	77	82	67
Organisational behaviour	68	76	86	77	81	90
Occupational hygiene	68	75	76	82	79	81
Health promotion	68	64	48	45	57	57
Rehabilitation	41	65	76	55	54	62
Wellness	41	53	48	45	53	52
Occupational medicine	18	39	29	55	71	67

The survey also asked stakeholders what skills and knowledge attributes need to be acquired at undergraduate and postgraduate levels. OHS professional, educator and graduate responses received regarding undergraduate and postgraduate programs (Table 4.6), reveal considerable uniformity. For undergraduate education, with one exception, 70% or more of each group identified all nominated skills and knowledge attributes as necessary educational outcomes. The one exception was that only 64% of educators (compared with 80% of professionals and 90% of graduates) nominated

'research methodology;' however, 90% of educators nominated this knowledge attribute as a necessary educational outcome of postgraduate education. A slightly larger percentage of graduates than educators and professionals considered skills related to 'problem solving,' 'team work' and 'communication' to be important educational outcomes from undergraduate programs.

For postgraduate education, responses revealed stakeholder expectations of a heavier emphasis on acquisition of knowledge attributes than skills. More than 85% of each group indicated that postgraduate educational outcomes should include 'OHS concepts, models, theories,' 'ethics and social issues' and 'research methodology.' The only skill that more than 70% of OHS professionals indicated should be acquired from postgraduate education was 'problem solving.' More than 70% of educators and graduates identified 'problem solving,' 'information retrieval,' 'written communication' and 'team work' as required outcomes from postgraduate education; more than 70% of graduates also nominated 'oral communication.'

In focus group discussions, it became clear that regulators' opinions with respect to education for OHS professionals differed quite markedly from those of participants in the other stakeholder groups. Also, as a group, regulators held widely variant views. One regulator strongly advocated the need for generalist OHS professionals to have a broad tertiary education grounded across the disciplines and overlaid with a broad range of OHS subjects:

It's got to have a foundation of sciences – behavioural sciences, health sciences...To understand health and safety the first thing you have to do is to understand people and you need to understand how a person works, so anatomy, physiology, etc. The other side of people is you need to know their psychology...which then cascades into being able to effectively communicate at all different levels and understanding the whole range of different people in the workplace, management right through to workers...Other knowledge areas – social history and how the laws came into being in the first place...understand the justice system, the compensation scheme and the legislative framework...strong understanding of stakeholders and the environment you are working in, which should assist in forming opinions of what reasonably practicable means...science like chemistry, physics and maths and how energy forces create hazards. Then you need to know enough about all the OHS specialties to make you competent but not necessarily a specialist.

Table 4.6: Skills and knowledge attributes that need to be acquired from OHS education

Skills and knowledge attributes	Undergraduate			Postgraduate		
	Educators %	Professionals %	Graduates %	Educators %	Professionals %	Graduates %
Skills						
Problem solving	86	84	90	81	75	81
Oral communication	86	82	95	67	64	81
Written communication	86	81	95	81	67	81
Information retrieval	82	80	81	81	66	71
Team work	77	74	90	71	64	71
Computer skills	77	70	76	57	54	62
Knowledge						
OHS concepts, models, theories	91	89	100	90	91	86
Ethics and social issues	86	81	95	95	87	95
Research methodology	64	80	90	90	90	95

Other regulators did not share this opinion; some questioned the need for generalist OHS professionals and advocated instead for Workplace Health and Safety Officers (WHSOs), and OHS representatives supported by specialist units located with the regulator. Even those regulators who did support the need for generalist OHS professionals questioned the need for tertiary-level OHS education. It was suggested that for high-risk industries, specialist OHS qualifications were required; that is, an undergraduate engineering, science or health degree with a specialist postgraduate degree in, for example, occupational hygiene or ergonomics. For medium and low-risk industries, vocational qualifications were considered adequate:

[In] high risk areas you might look for specialist qualifications...but in general we are talking about a reasonable knowledge of OHS at a practical level and that would be a Diploma of OHS with competencies in investigation, risk management, consultation...

Other regulators were unclear about what an OHS tertiary program covered.

One commented:

It is this general OHS I have never really been clear on, because you are talking about doing three years of OHS, that doesn't sound right. I can understand someone doing Chemical Engineering and then doing a bit of something else because you know who you are then, but I've never understood this general OHS.

4.2.3 Minimum education level

Pinpointing a minimum educational level for generalist OHS professionals proved a complicated issue due to a range of factors including the lack of clarity between the purpose of vocational training and tertiary education, various perceptions of OHS, the historical legacy of OHS professionals in Australia and the regulatory approach to OHS. As would be expected from the regulator focus group discussion referred to above, there was no clear consensus among regulators about a minimum education level for generalist OHS professionals. One regulator firmly supported the need to move to a minimum entry level of an undergraduate degree. Representatives from another state's regulatory body strongly advocated vocational qualifications, stating:

The whole training framework in the western world is saying that tertiary isn't the only pathway.

Another did not have a preference between vocational and tertiary, stating:

I do not think one is necessarily better than the other, they're different and you would do one or the other for different reasons.

Survey responses to a question about the minimum education level required for a generalist OHS professional were mixed (Table 4.7). A majority of educators (67%) indicated that a tertiary-level qualification should be the minimum standard, although more than a quarter would accept vocational qualifications. In educator focus groups, discussion about entry level focused mainly on whether it should be an undergraduate or postgraduate qualification, not

vocational. It is possible the educators' response to this question acknowledges the current reality that there are few undergraduate programs and for most generalist OHS professionals the route to education is initially vocational and then postgraduate. At the ALTC OHS Educators' Workshop, however, tertiary-level education was unanimously endorsed as the minimum entry-level requirement for a generalist OHS professional.

More than half of the RTOs felt that a vocational qualification is an appropriate minimum educational level. Of graduate responses, 85% indicated a clear entry-level preference for tertiary (mainly undergraduate) qualifications. Professionals demonstrated variation in their responses to this question, with approximately one-quarter indicating vocational, one-quarter indicating any qualification (vocational, undergraduate or postgraduate) and most of the remainder endorsing tertiary qualifications. Entry level was heavily debated during professionals' focus group discussions; some of the 'other' responses provided in the survey were raised with comments such as:

Six years of relevant documented experience.

Level of entry equivalent to Queensland WHSO qualification.

Competence can come from experience, education or a combination of both, but professionalism should always include a component of education at some level.

Experience supported by education, not the other way.

None of the above; get some work experience.

Table 4.7: Minimum educational level for an entry-level OHS professional

Education level	Educators %	Professionals %	Graduates %	RTOs %
Vocational	24	24	5	52
Undergraduate	43	20	62	10
Postgraduate	5	5	0	0
Tertiary: UG or PG	19	16	24	32
Qualification: vocational, UG or PG	5	26	10	0
Other/Not specified	5	9	0	7

4.2.4 Type of learning

All focus groups paid considerable attention to the debate about experience versus formal education for OHS professionals; there was considerable agreement with the idea that a competent generalist OHS professional requires both education and experience. This was confirmed by survey responses to the question, ‘How important do you think knowledge learning is compared with experiential learning?’ As Table 4.8 shows, more than 50% of all stakeholders surveyed believed knowledge and experiential learning were equally important. For those respondents who did not consider the two forms of learning equally important, professionals and graduates were more likely to consider experiential learning more important, while educators were more likely to favour knowledge learning.

Table 4.8: Knowledge learning versus experiential learning

Knowledge learning vs experiential learning	Educators %	Professionals %	Graduates %
Knowledge learning is definitely more important	9	9	0
Knowledge learning is slightly more important	18	10	14
Equally important	55	54	57
Experiential learning is slightly more important	14	16	29
Experiential learning is definitely more important	0	10	0

While there was general agreement in all stakeholder focus groups that both knowledge and experience were important, one of the major issues identified was which should come first, formal knowledge or experience. Some group participants, particularly professionals, advocated a minimum of three years experience in the workforce prior to entry to an undergraduate program, while others argued that potential OHS professionals needed knowledge from education followed by work experience to make sense of that knowledge, and that to some extent it was an iterative process. One professional stated:

They need supervised mentoring throughout the [education] process to give them an adequate amount of experience when they graduate so they can hit kind of stumbling rather than crawling; you wouldn't expect them to run in terms of experience but you at least expect them to be able to navigate their way.

Participants in many of the focus groups discussed how an undergraduate degree could be structured to achieve the 'right' balance between knowledge and experience. One proposal was a four-year professional degree, similar to degrees available in some allied health professional fields, where first-year content is discipline-based, second-year content is focused on generalist OHS subject areas combined with work experience, third year involves a combination of practicum with specialist OHS subject areas, and the final year involves an internship. Another suggestion was a combined degree; that is, an undergraduate degree in any discipline area as long as it includes a major in OHS and progressive work placements (internships) in its latter half, combined with a Master of Occupational Health and Safety.

4.2.5 Delivery and assessment

Methods of delivery of OHS education were explored in focus groups and in the surveys of educators and graduates. Table 4.9 presents delivery/learning methods as identified by educators and graduates. Graduates were asked to rate the usefulness of various teaching methods relevant to achieving student learning outcomes (Table 4.10). While all delivery methods were considered 'useful' or 'very useful' by the vast majority of graduates, methods such as practicums, independent research and problem-based learning were ranked by more graduates as 'very useful' than the traditional approaches of lectures and tutorials.

Focus group discussions of delivery and learning methods concentrated on two main areas. The first involved the debate between 'traditional weekly attendance' delivery and 'distance' modes of delivery. It was generally agreed that 'regular attendance' was preferable, but there was acknowledgement that

Table 4.9: Current delivery/learning styles used by educators

Delivery/Learning method	% methods used
Self-directed reading	95
Online/flexible learning	91
Lectures	82
Problem-based learning	82
Independent conduct of research	68
Tutorials	68
Seminar presentation/attendance	59
Practicums	55
Labs	41
Industry mentoring	27
Other/Not specified	9

Table 4.10: Value of different delivery/learning methods as rated by graduates

Delivery/Learning method	very useful %	useful %	not useful %	not useful at all %	neutral %	not applicable %
Practicums	71	5	0	0	5	19
Independent research	52	48	0	0	0	0
Problem-based learning	52	29	5	5	10	0
Self-directed reading	48	33	0	0	14	5
Industry mentoring	43	38	0	0	5	14
Tutorials	38	52	0	0	10	0
Labs	33	52	0	0	10	5
Lecture	33	52	5	0	0	10
Online/flexible learning	29	52	0	0	10	5
Seminar presentation/attendance	29	33	0	0	5	19

current social, economic and political realities will lead to increasing use of 'distance,' 'blended' and 'flexible' modes of delivery. While it was recognised that improved technology has favoured the delivery quality of distance education, most stakeholders agreed that distance education programs needed a face-to-face component. The second area of discussion raised in all stakeholder focus groups was the need for the methods to be grounded in real-

world OHS professional practice. Generally, it was felt that such methods as practicums, problem-based learning and industry placements were ideal ways to develop knowledge, skills and attributes required by competent OHS professionals.

In the focus groups, especially those involving professionals and educators, discussion of assessment approaches was strongly linked to delivery methods. There was a strong agreement that assessment of OHS content, like delivery methods, had to be linked to real-world OHS professional practice. Some suggestions arising from the focus groups were:

Have a student come [to a workplace]...learn about how to do those risk assessments and all the other business things that go along with that, then make up a JSCA and then write a safe operating procedure...They'll have to talk to people – the engineers, the workers. They'll get their hands dirty, but they'll learn.

Get them to develop a training course on, say, reading an MSDS. Don't get them to present to their student mates, make them go and deliver it to the folk working in the warehouse where it is stored and handled.

Work experience should be dealt with like other clinical placements. You have set of skills, competencies, knowledge they have to have; make them demonstrate it. Don't pass them if they can't demonstrate properly in the workplace the things you think are essential.

Another suggestion involved the development of a whole-of-program professional learning portfolio that requires students to demonstrate their knowledge and critically reflect on their OHS learning. Students would be required to develop this over the course of their degree and it would be one of the pre-requisites for graduation; this could also be used as evidence in an application for professional accreditation.

4.3 Summary

Education of OHS professionals does not follow the traditional tertiary education path of an undergraduate degree for foundation knowledge and skills followed

by a postgraduate degree for deepening knowledge in specialist areas. Decline in the numbers of undergraduate programs combined with a high incidence of experienced OHS practitioners seeking university entry at postgraduate level and, perhaps, the low value placed on tertiary education by state regulators, have led to a situation where many postgraduate students do not possess the foundation knowledge required for postgraduate study.

While there is little consensus among stakeholders regarding the relative importance of disciplines underpinning OHS education and of specific curriculum content areas for undergraduate and postgraduate programs, all agree that generalist OHS professionals require a broad knowledge base. Areas of generalist OHS professional competency ranked highly by all surveyed stakeholder groups are 'OHS management systems,' 'OHS law,' 'risk management,' 'accident investigation,' and 'OHS auditing.' With the exception of 'OHS auditing,' these are subject areas currently taught in all existing undergraduate programs in Australia.

Stakeholders agree that a competent generalist OHS professional requires both education and experience. There is scope for structuring undergraduate degrees to achieve a more stakeholder-acceptable balance of knowledge and experience. This could be achieved through effective use of delivery methods such as industry placements, and practicums and problem-based learning grounded in real-world OHS professional practice.

5. STRENGTHS, CHALLENGES AND GAPS IN THE DELIVERY OF OHS EDUCATION

This section identifies strengths, challenges and gaps in the delivery of OHS education in Australia. From the diverse views of key stakeholders – as expressed in survey questionnaires, interviews, focus groups and a workshop – recurring themes are discernible.

5.1 The challenging nature of OHS education

During the last decade there has been a trend towards discontinuing some undergraduate OHS programs and downsizing others. Viability and continuity of OHS programs is but one of many challenges facing OHS tertiary education in Australia. Challenges reviewed in section 2 of this report include (a) lack of clarity of role and disciplinary underpinning, (b) lack of an agreed core body of knowledge for OHS professionals, (c) lack of clarity on the required educational level for an OHS professional, and (d) lack of course accreditation. Another major difficulty Australian OHS educators face is the relatively small size of teaching units within Australian universities. OHS units have, in the main, been minimally staffed with sometimes only one, two or three academics. Low staff numbers in OHS units have meant high teaching loads and a lack of a critical mass in terms of enhancing the research capacity. As a result, the contribution to knowledge creation, a cornerstone of academic endeavour, has been diminished. This has led to OHS education in Australian universities taking on more of a teaching function and less of a research and research-training function (Capra, 2006).

The faculty and discipline location of OHS teaching units is variable, ranging from business and science to health science and public health. This can be perceived as both a challenge and a strength, a challenge in terms of identity development but a strength in that it reflects and complements the multidisciplinary and transdisciplinary nature of OHS.

Our nation is entering an era in which issues such as sustainable development and a carbon neutral economy are of paramount importance. Add to this the ongoing complexities of globalisation, the financial crisis and technological change, and the result can be a perplexing public policy environment. OHS educators might well encounter difficulty in predicting concomitant changes in work practices let alone designing preventive education strategies to minimise harm from work.

The following strengths, challenges and gaps in the delivery of OHS education, as identified by key stakeholders, provide valuable insight into the education of OHS professionals and present opportunities for OHS to develop as a discipline.

5.2 Strengths

While much of this project focuses on the challenges facing OHS education, many positive aspects of the current state of Australian OHS education have been identified by 'clients' of OHS tertiary education – graduates, professionals and regulators – as well as by the educators themselves. Table 5.1 indicates the level of satisfaction with current OHS education as expressed by professionals and graduates in response to the survey questions: 'Are you happy with the way OHS practitioners are being educated in Australian universities?' and 'Were you happy with the way you were educated in OHS at your university?' respectively. Within the relatively large sample of OHS professionals, individual educational experiences vary from TAFE training to higher degrees. Unfortunately, the sample of graduates is small, the result of recruitment difficulties explained in section 3.3.2. Positive views ('very happy' or 'happy') were expressed about current education by only 35% of professionals compared to a large majority (81%) of graduates. More professionals (43%) than graduates (14%) nominated a 'neutral' position. Negative views ('unhappy' or 'very unhappy'), expressed by 20% of professionals and 5% of graduates, are reviewed in section 5.3.

Table 5.1 Satisfaction with the way OHS practitioners are being educated

Response	Professionals (n=412) %	Graduates (n=21) %
Very happy	4	29
Happy	31	52
Neutral	43	14
Unhappy	18	5
Very unhappy	2	0

Both positive and negative responses were elicited when focus group participants were asked about their level of satisfaction with current tertiary education of OHS professionals. Positive responses from the regulator focus groups included:

Personally I'm quite happy with my people who have done the Grad Dip; it's given them a greater appreciation, a better set of skills and everything else.

Our graduates who have come into the Inspectorate...have come from a variety of courses; there's been no history of us having any problems with any particular course.

During structured interviews, educators were asked: 'What are the strengths of the teaching and learning in your department?' Responses were obtained from 15 program convenors/coordinators representing 12 universities with full OHS programs at either undergraduate or postgraduate level. While the range of responses is rich in diversity (Appendix 7), recurring themes are discernible: (a) the multidisciplinary nature of OHS educator groups, (b) expertise diversity, and (c) adaptation to and use of technology.

During the course of the April 2009 ALTC OHS Educators' Workshop held in Sydney, participants were split into three subgroups and asked to discuss a range of topics and report back to all participants. As part of this process, groups were asked to identify the strengths, challenges and gaps in the delivery

of OHS education. The following strengths in the delivery of OHS education were identified.

- Transdisciplinary nature of OHS education
- Diversity of educators
- Experience of the academy
- The continuing high rate of work-related illness and injury was seen as a driving force for increased OHS professional education and hence a strength in terms of supporting OHS education
- Trust and respect for other educators' points of view
- Credibility of degree programs
- Willingness of industry to engage with graduates and educators
- Depth of knowledge displayed by graduates
- Positive attitude of students to undergraduate and postgraduate programs
- Students/graduates are well paid
- Mature students in postgraduate programs bring experience

5.3 Challenges

While the level of satisfaction with current OHS education as expressed by professionals and graduates was predominantly positive or neutral (Table 5.1), slightly more than 20% of professionals and 5% of graduates surveyed indicated they were 'unhappy' or 'very unhappy' with the current state of OHS education. Table 5.2 summarises the major themes expressed by professionals and graduates in response to the questions: 'If you are unhappy or very unhappy with the way OHS practitioners are being educated, WHY?' and 'If you were unhappy or very unhappy with the way you were educated, WHY?' respectively.

Given the relatively small response rate of graduates, the majority of responses to the question came from practicing OHS professionals. As indicated in Table 5.2, the greatest degree of concern is related to a lack of industry experience in tertiary programs, followed by concerns related to course structure, consistency between courses and course standards.

Table 5.2 Reasons why professionals and graduates are unhappy with OHS tertiary education

Theme	No. responses
Lack of industry experience	49
Inappropriate course structure	29
Lack of consistency between courses	13
Course standards (not high enough)	8
Limited course availability	5
Inappropriate delivery methods	3
Lack of role definition	3
Cost (too expensive)	1
Wrong attitude towards OHS	1
OHS not important from university viewpoint	1

Focus group discussions yielded two pertinent challenges: (1) that courses were too ‘soft’ (*“I must admit they were soft”*) and (2) that students were not graduating with the ability to successfully apply learned theory and constructs in work environments (*“My impression is they come out from uni...with no practical knowledge...and the big problem is they can’t make the steps from what you’ve learnt theoretically and apply that in a practical sense”*).

During interviews, educators were asked: ‘What challenges has your department/unit faced in the learning and teaching of OHS in the last 3 to 5 years?’ Responses were obtained from 14 program convenors/coordinators representing 12 universities with full OHS programs at either undergraduate or postgraduate level. There was some commonality in the concerns expressed and the following recurring themes can be identified: (a) loss of programs especially at undergraduate level, (b) staffing and general resource issues, (c) undervaluing of OHS within the organisation, and (d) adoption of modern technologies. Appendix 8 documents the full range of concerns held by interviewed OHS educators about the particular kinds of challenges they perceive their organisations to be facing. This data suggests that OHS

education in Australia is in difficult circumstances and that concerted action is needed to ameliorate program closure, resource shortages, the crowding out of research, the theory and practice divide, and the outsourcing (except in cases where special expertise is needed) of teaching when such outsourcing places extra administrative pressures on full-time staff.

Challenges to the delivery of OHS education identified during the course of the ALTC OHS Educators' Workshop were:

- Difficulty in recruiting undergraduate students
- Misalignment of experiential learning
- Generation of a core body of knowledge
- Accreditation issues of OHS professionals need to be addressed
- Difference in graduate and employer expectations of job readiness
- Need for academics to have industry experience
- Lack of critical research base
- Difficulties with the introduction of e-learning in terms of practicals, attrition, quality control and maintenance of standards
- Curriculum development is difficult when high levels of casual staff exist
- Making educational programs reflect transdisciplinary practice
- Facilitating open discussion and sharing of views
- Developing a shared conceptual underpinning to put to regulators, industry and the community
- Exploring the various realities of the results of transdisciplinary practice in the construction of knowledge
- Developing a common language
- Exploring the underpinning of epistemology and ontology
- Differentiating between OHS application space and the OHS domain (of the OHS professional)
- Need to focus more on worker wellbeing; courses need to put the 'H' back into OHS
- Need to teach students how to work and communicate strategically
- Need to get OHS into the curriculum in other programs such as engineering, medicine and business
- Need to 'un-teach' the myths that postgraduate students have
- Need for students to work part-time with a consequent lack of focus on program

5.4 Gaps

The following gaps in the current delivery of tertiary OHS education were identified during the 'strengths, challenges and gaps in the delivery of OHS education' group discussions at the ALTC OHS Educators' Workshop.

- Experiential component in programs
- Writing skills with a need to differentiate between business writing and academic writing
- Communication skills
- Lack of consistency in OHS education programs; and between undergraduate and postgraduate, and with TAFE
- Need for meta skills as opposed to generic skills: assessment and understanding of team work, peer review, self assessment
- Development of training skills and engendering of principles of change management, conflict resolution and negotiation skills
- Lack of a common underpinning and philosophical and theoretical frameworks
- Lack of a common language for OHS
- Lack of educational theory among OHS educators
- Alignment of what is taught with what stakeholders want/need
- Importance of OHS educators versus status of OHS education within universities
- Ongoing collaboration between educators, regulators and industry in relation to curriculum development

5.5 Summary

Strengths, challenges and gaps in the delivery of OHS education have been elucidated as a result of input from key stakeholders. Common threads have emerged across the stakeholder groups. Strengths identified include the substantial knowledge competence of the OHS academy, efficient adoption of modern technologies in teaching and learning, and a reasonable level of client satisfaction and goodwill with respect to current praxis in OHS education.

Challenges identified include issues relating to what constitutes a core body of knowledge for OHS education, resource thinness, the status of OHS education within the hierarchy of many universities, and the manner in which educational administrators might perceive the importance of the discipline, program downsizing and closure, especially at the undergraduate level. Gaps identified indicate a need to balance theoretical and experiential learning, a need to develop a common language for OHS education, and a need to foster effective and ongoing collaboration between educators, regulators and industry.

6. SUSTAINABILITY OF THE ACADEMY

This section examines factors that affect the continuation of people working in OHS education in Australia. Sustainability of the 'academy' is addressed with a focus on the current size of the OHS tertiary education workforce, the age profile of OHS educators, the expected level of qualifications and experience for OHS educators, educator recruitment and retention issues, and the extent of succession planning being undertaken in Australian universities.

6.1 Numbers of OHS tertiary educators

Quinlan's (1995) observation that the Australian OHS academy was threatened by a lack of available qualified staff and small centres of OHS education remains relevant today. The number of OHS educators in Australia is difficult to determine due to the diversity of paradigms underpinning OHS practice; with OHS education located in several different teaching areas, identifying OHS educators is not a straightforward process. Currently, it is estimated that a total of 60 people work in OHS education in the 15 Australian universities identified by the Safety Institute of Australia (2008) as offering OHS education at undergraduate or postgraduate level. For this project, 51 of these educators were identified; of these, 22 completed a questionnaire, 25 participated in focus group discussions, and 22 attended the ALTC OHS Educators' Workshop.

In 2004, Pryor established that numbers of academics in Australian centres of OHS education ranged from 1.2 in the smallest centres to 8 in the largest, with a median of 3.5, plus sessional staff. The current study reveals a similar profile with numbers of full-time academics (in teaching roles) ranging from 1 in the smallest centres to 6 in the largest centres. Most interviewed educators (95%) reported that they did not believe that their university had a critical mass of people working in OHS. To increase capacity, some universities rely on guest lecturers from large organisations; some have taken to appointing casual staff

as a cost-cutting measure. However, obtaining well-qualified casual staff can be difficult due to the amount of money being offered elsewhere (Pryor, 2004).

6.2 Age profile

The age range of respondents to the OHS educators' survey was 28 to 66 years, with a mean age of 50.7. This high mean is a sustainability concern as it suggests an ageing academy with many educators approaching retirement. During focus groups and interviews, it was revealed that some universities may consider closing programs if particular individuals were to retire. Although the retirement age is increasing in Australia, sustainability of the discipline requires recruitment to at least keep pace with attrition.

6.3 Qualifications and experience

As noted in section 3, 50% of all educators who completed the survey reported having a PhD qualification. Of the remaining educators, 30% are currently undertaking a doctorate. One educator nominated a vocational qualification as their highest education level; this is unusual as most universities require academics to hold at least the degree of the level at which they are teaching.

The responses of OHS professionals to the survey question: 'What do you think is the appropriate educational qualification for university OHS educators?' revealed that at least 66.5% of professionals consider it appropriate for educators to have had university education, with 'postgraduate' the most-nominated appropriate educational level (Table 6.3).

When asked how much OHS experience a university OHS educator should have, 64.5% of professionals nominated '5 to 10 years' (Table 6.4). Currently, the mean number of years worked in OHS by university educators is 18.8 (Table 3.4). It appears that OHS professionals are generally in agreement with Pryor's (2004) description of the ideal OHS educator as someone with a high

level of knowledge and considerable experience (either broadly-based or in a specialty area), who is able to move between industry and OHS academia.

Table 6.1: Appropriate educational qualification for university OHS educators according to OHS professionals

Educational level (No. responses)	%
Vocational (14)	3
Undergraduate (21)	5
Postgraduate (112)	27
Research higher degree (47)	11
Either undergraduate or postgraduate (49)	12
Both undergraduate and postgraduate (50)	12
As long as they have worked in the industry, no qualification required (43)	10
Other* (73)	17

*included trade qualifications and different combinations of education and work experience

Table 6.2: Appropriate experience levels for university OHS educators according to OHS professionals

Length of experience (No. responses)	%
OHS experience is not necessary (1)	2
Less than 5 years OHS experience (19)	5
5 to 10 years OHS experience (271)	65
More than 10 years OHS experience (107)	26
Other* (14)	3

*included trade/specific experience and combinations of experience and education

6.4 Recruitment and retention

The responses of educators to survey questions that asked them to nominate factors that influence staff recruitment and retention revealed that the factors identified as having a positive influence on recruitment were the same factors identified for retention, albeit in a different order of relative importance (Tables 6.1 and 6.2). More educators nominated ‘opportunities for further study’ as a positive influence on both recruitment and retention than any other factor. Other positive influences nominated by at least 50% of respondents were: for recruitment, ‘employment conditions,’ ‘work environment’ and ‘location;’ and, for retention, ‘salary/total package.’

The same negative-influence factors were identified for recruitment and retention, with ‘other job opportunities’ the category most nominated as a negative influence. Of relevance here is that all educators in focus groups and interviews reported that they could earn more money in industry; the wage differential between university and business employment, and its changing impact across business cycles, could warrant further investigation.

Table 6.3: Factors that influence staff recruitment

Factors with positive influence on recruitment (%)	Factors with negative influence on recruitment (%)
Opportunities for further study (70)	Other job opportunities (79)
Employment conditions (65)	Salary/total package (60)
Work environment (50)	Promotional opportunities (47)
Location (50)	
Research support (47)	
Resources (45)	

Table 6.4: Factors that influence staff retention

Factors with positive influence on retention (%)	Factors with negative influence on retention (%)
Opportunities for further study (63) Research support (50) Work environment (45) Location (42) Resources (37) Employment conditions (35)	Other job opportunities (80) Salary/total package (65) Promotional opportunities (50)

The nomination of ‘promotional opportunities’ as a factor that impacts negatively on both recruitment and retention was supported in focus group discussions and during the ALTC OHS Educators’ Workshop. Many educators felt that there was a lack of recognition for the external responsibility that is part of the OHS work profile. One educator stated:

I sit on internal and external OHS committees but this is not recognised by the university’s promotional criteria.

There was agreement that OHS needs to attract more research funding as this is the general measure of research success for promotional purposes. However, attaining funds for OHS research presents a significant challenge, considering the relative scarcity of such funding. One interviewed educator reported that his research was not in an area considered important by his school. Another relevant issue is that while most universities require candidates for promotion to hold a doctoral degree, opportunities for PhD candidature in OHS are limited.

6.5 Succession planning

In the context of this report, succession planning refers to medium and long-term organisational plans held for staff. Only 19% of educators surveyed reported the existence of succession plans at their OHS centres. Of these, most were located in universities featuring a relatively large group of OHS educators.

Three educators reported that their OHS centre succession plans were not necessarily supported by their universities. One educator commented that the economic situation made it difficult for any area of the university to do succession planning. Nevertheless, all educators at the workshop acknowledged the importance of succession planning, with several offering relevant suggestions, including: that succession planning extend to openly encouraging interested students into higher degrees and then into the profession; that *“external pressure from professional associations may be helpful”* as an effective stimulus to succession planning; and that changes to legislation to include specification of necessary OHS education qualifications may reinvigorate demand for OHS courses and heighten interest in the profession as a whole.

6.6 Summary

This section has established that sustainability of the Australian OHS academy remains threatened by an inadequate supply of qualified educators and small centres of OHS education, problems identified more than a decade ago by Quinlan (1995). Another issue on the horizon is the ageing academy; sustainability will require recruitment to at least keep pace with attrition. It may prove necessary to address negative influences on recruitment and retention such as the ability of OHS professionals to earn more working in industry than in OHS education and the current mismatch with the university sector's promotional criteria. However, the academy of OHS educators is a highly qualified group with considerable depth of OHS experience. Also, it is important to note that the level of OHS qualification should be indicative of an academic skills set that enables the educator to develop pedagogically sound tertiary training; to design and supervise research programs; to analyse and communicate outcomes of research; and to represent the OHS academy in the tertiary education forum. Support from external organisations could boost the profile of OHS education in universities and ultimately enhance the sustainability of the academy.

7. A COMMUNITY OF PRACTICE OF OHS EDUCATORS

This section explores the concept of a 'community of practice' (CoP) of OHS educators. It includes an assessment of how CoP characteristics might be expressed in an Academy of OHS Education and Research.

7.1 What is a 'community of practice' (CoP)?

Wenger, McDermott and Snyder (in Gunawardena et al., 2009) defined communities of practice as “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” Wenger (1998) described three CoP dimensions:

What it is about – its *joint enterprise* as understood and continually renegotiated by its members

How it functions – *mutual engagement* that binds members together into a social entity

What capability it has produced – the *shared repertoire* of communal resources (routines, sensibilities, artefacts, vocabulary, styles, etc.) that members have developed over time.

Gunawardena et al. (2009) summarised these dimensions as 'domain,' 'community' and 'practice,' and noted that when these three elements function well together, the CoP becomes an ideal knowledge structure – a social structure that can assume responsibility for developing and sharing knowledge.

7.2 Does an OHS CoP exist?

7.2.1 Background

There is precedent for a CoP of OHS educators in Australia. While not applying the term 'community of practice,' Quinlan (1995) described how the networking and collaboration that occurred as part of the development of a national guideline for tertiary-level OHS courses (NOHSC, 1994) led to a

multidisciplinary conference of OHS tertiary educators from Australia and New Zealand in 1994. This conference, organised by the educators themselves with logistical support provided by the National Occupational Health and Safety Commission, was attended by 97 of the 180 people identified as OHS educators in Australia and New Zealand at the time (Quinlan, 1995). One of the stated aims of the conference was to establish a network of educators so that similar exchanges could continue in the future; thus the Australian New Zealand Association of OHS Educators (ANZOHSE) was established and incorporated. At the time, tertiary OHS educators in particular felt that existing OHS professional bodies did not adequately meet their needs (Quinlan, 1995). The primary activities of ANZOHSE were conferences in Adelaide, Brisbane, Auckland, Hong Kong and Melbourne.

Despite a strong start, several factors – including the increasing workload of university-based educators, the move to greater use of sessional staff and, in some cases, the demise of tertiary OHS programs with associated staff reductions – combined to impact negatively on ANZOHSE membership numbers. The remaining members lacked sufficient time or energy to support the association with volunteer labour. In 2004, ANZOHSE merged with the Safety Institute of Australia (SIA) to form the OHS Educators' Chapter of the SIA. Despite several SIA attempts to entice members of ANZOSHE to join the SIA, including waiving the first year of membership fees, few tertiary OHS educators became SIA members.

7.2.2 The situation today

The OHS Educators' Chapter exists today as a special interest group of the Safety Institute of Australia. Membership is open to financial members of the Institute with an interest in OHS education, to educators of OHS professionals and practitioners, to vocational trainers involved in OHS education and training, and to OHS workplace trainers. Currently, there are 142 members. Although it is not possible to identify those members who are tertiary-level OHS educators, the governing rules require that office bearers be directly involved in education

or training of OHS professionals or practitioners, or be OHS researchers. Also, one of the Safety Institute of Australia committee positions is designated to represent tertiary OHS educators.

Membership of the Safety Institute of Australia includes discounted entrance to conferences and seminars, access to a weekly electronic newsletter and a quarterly journal, and opportunities to comment on and input to legislation, standards documents, and public inquiries such as the 2008 Victorian inquiry into fatalities at level crossings and the 2009 Royal Commission into the Victorian bush fires. The OHS Educators' Chapter offers a web-based discussion forum for educators, a list of publications related to OHS education, and an OHS course finder. The OHS Educators' Chapter has been an active partner in *Safeguarding Australians* with all three office bearers plus a committee member filling primary researcher roles. It is represented in the Victorian Health and Safety Professionals Alliance (HaSPA), a WorkSafe Victoria-funded alliance of OHS professional bodies and Victorian-based universities offering OHS professional education. Through HaSPA, the OHS Educators' Chapter convened a working party to initiate discussion on development of the core body of knowledge for generalist OHS professionals; this 'Body of Knowledge' project is to be funded by WorkSafe Victoria. The OHS Educators' Chapter facilitates involvement of educators through surveys and focus groups, and provides progress reports to members and the public through electronic bulletins, the website and the printed journal.

Anecdotal evidence suggests that a significant proportion of tertiary OHS educators are not members of the Safety Institute of Australia and therefore not members of the OHS Educators' Chapter. In April 2009 at the ALTC OHS Educators' Workshop, three main reasons for the reluctance of some OHS educators to become members of the Institute were identified:

- negative perceptions of the Safety Institute of Australia, including perceptions that the Institute has a narrow focus on safety (rather than on health, and safety and risk) and that it does not offer access to processes that support university-based educators

- some educators with membership of one or more professional bodies in their special interest areas are reluctant to pay for membership to another body, especially if they hold a negative perception of the Institute, as outlined above, or cannot identify clear personal benefits of membership
- some educators/researchers do not meet the Institute's membership requirements (e.g. they may have an OHS degree but lack sufficient workplace experience, or may have a degree in another area)

It appears that while a structure with some resources exists to support a CoP of tertiary-level OHS educators, currently it is underutilised largely due to a perception that it does not meet the needs of educators. Also, there are eligibility barriers to membership for some educators. Consequently, the OHS Educators' Chapter of the Safety Institute of Australia does not yet comprise a CoP of OHS educators because of the limited extent to which it meets the domain, community and practice criteria specified by Wenger (1998) and further discussed by Gunawardena et al. (2009).

7.3 Is there a requirement for an OHS CoP?

Tertiary-level OHS educators attending the ALTC OHS Educators' Workshop as part of this project were overwhelmingly in favour of establishing a structure to support an ongoing CoP. This was evidenced in the 'energy' of the group, in evaluation reports where 82% of attendees 'agreed' or 'strongly agreed' that they would like to be involved in a CoP and, most definitively, in 'The Sydney Declaration.' This declaration was drafted by one of the workshop subgroups then put to the whole group; following modifications it was approved unanimously by workshop participants and subsequently released to the press. 'The Sydney Declaration' is reproduced below:

24 April 2009

Academy of University OHS Education & Research – The Sydney Declaration

Currently, 5% of Australian GDP is consumed annually by the cost of workplace incidents, injuries, disease and fatalities nationwide.

In this context, the emerging Academy of University OHS Education and Research met in Sydney today to contribute to the ALTC project *Safeguarding Australians*.

At the forum, 15 of the 17 universities that currently deliver OHS tertiary programs across Australia were represented. During the forum, key issues identified included the need to:

- articulate the core body of OHS knowledge for accreditation of courses,
- enhance the role and profile of OHS university education and research,
- enhance the quality and sustainability of OHS education, and
- increase the number of OHS research higher degree scholarships.

The Academy is strongly committed to taking action on these matters and calls on the community, industry and OHS regulators to work with us.

Questions that now need to be addressed include:

- How can this 'academy,' which came into existence by virtue of the press release, be formally established, structured and resourced?
- What might be the relationship with the Safety Institute of Australia OHS Educators' Chapter?
- What action might it take to facilitate the four key issues identified in the press release?

7.4 Creating and sustaining a CoP of OHS educators

At the ALTC OHS Educators' Workshop, subgroups identified issues and challenges relevant to creating and sustaining a CoP of professional OHS educators. These included: workload and time constraints; logistics, particularly relating to the small numbers of university-based OHS educators and researchers; inter-university competition for students and research funding; tyranny of distance and travel implications for conferences and face-to-face communication; competition with other OHS and educational professional bodies; the extent to which OHS is recognised as a profession; and the low ranking of OHS education in university priorities. While workshop participants acknowledged positive reasons for locating the OHS academy within the Safety Institute of Australia OHS Educators' Chapter, they identified several issues that need to be addressed before a fledgling academy can tackle the four key issues identified in the press release (Table 7.1).

Table 7.1: Benefits and issues to be addressed relevant to locating the OHS academy within the SIA OHS Educators' Chapter

Benefits of locating the academy within the OHS Educators' Chapter	Issues to be addressed if OHS Educators' Chapter is to provide the support structure
<ul style="list-style-type: none"> • Access to existing infrastructure including: <ul style="list-style-type: none"> ○ secretariat providing administrative functions ○ web facility ○ journal ○ other communication processes ○ conference program and established conference organising processes and support • Established relationship with OHS regulators, especially in Victoria, and related potential for access to funding and other support 	<ul style="list-style-type: none"> • Access to membership by those educators and researchers who do not currently meet membership requirements • Access to membership for those educators and researchers who currently hold membership in other OHS professional bodies • Ownership of space (i.e. the academy name) within the SIA Educators' Chapter that is identified as 'university-based educators and researchers' • Issues related to national versus state-based management and service processes and the 'safety practitioner' 'hats and boots' image • Quality of OHS education papers at SIA conferences, lack of peer-reviewed processes and cost of conference attendance

7.5 What CoP outcomes are envisaged?

With some organisational changes, the Safety Institute of Australia OHS Educators' Chapter can provide resources and a suitable structure for the Academy of OHS Education and Research. Many of the perception and image issues raised at the ALTC OHS Educators' Workshop are already being attended to by the Safety Institute of Australia as part of a major organisational review and restructure. The Rules of Governance for the OHS Educators' Chapter have been re-drafted to address issues raised at the workshop and have been submitted to the National Board of the Safety Institute of Australia for comment; these draft rules will then be circulated for comment to workshop participants and educators and researchers unable to attend the workshop. Also to be circulated for comment is the work plan for the OHS Educators' Chapter, which has been modified to reflect the outcomes of the workshop and, specifically, the potential activities of the Academy of OHS Education and Research (Figure 7.1). It should be noted that while one arm of the activities outlined in Figure 7.1 refers to promoting and sustaining engagement, all arms are necessary for an effective CoP with characteristics as described by Wenger (1998).

Identified as a joint enterprise requiring the engagement of OHS educators to develop a shared repertoire, the 'Body of Knowledge' project has been used to demonstrate how Wenger's (1998) CoP characteristics might be expressed in the Academy of OHS Education and Research (Table 7.2).

7.6 Summary

A community of practice of OHS educators existed in Australia in the 1990s and early 2000s. This CoP dissipated due to workload, time pressures and reduction in numbers of OHS educators. In 2004, an attempt to revitalise the CoP by transferring it to the Safety Institute of Australia, which could provide infrastructure, met with limited success.

This ALTC project and its OHS Educators' Workshop, combined with imminent funding from WorkSafe Victoria for the 'Body of Knowledge' project, have generated substantial interest in establishing a CoP for OHS educators and researchers. Indeed, workshop participants expressed commitment to go beyond an informal community to create an 'Academy.'

With some modifications, the structure for re-invigorating a CoP for professional OHS educators can be provided by the Safety Institute of Australia OHS Educators' Chapter. The 'Body of Knowledge' project will engage all educators in a common goal. Momentum and progress of the CoP will depend on: the establishment of an active volunteer committee; the willingness of OHS educators and researchers to contribute; the extent to which competitive forces inherent in the university sector fracture collaboration and teamwork; and the ability of the Academy of University OHS Educators and Researchers to speak with one voice to powerbrokers about key concerns, and to share success amongst its members; and, finally, the willingness of researchers and reflective thinkers to find a home within a new Safety Institute of Australia initiative, should one eventuate, or within another CoP. The forces confronted by ANZOHSE a decade ago are just as relevant today and each can militate against attainment of CoP criteria outlined by Wenger (1998).

Figure 7.1: Potential activities of the Academy of OHS Education and Research

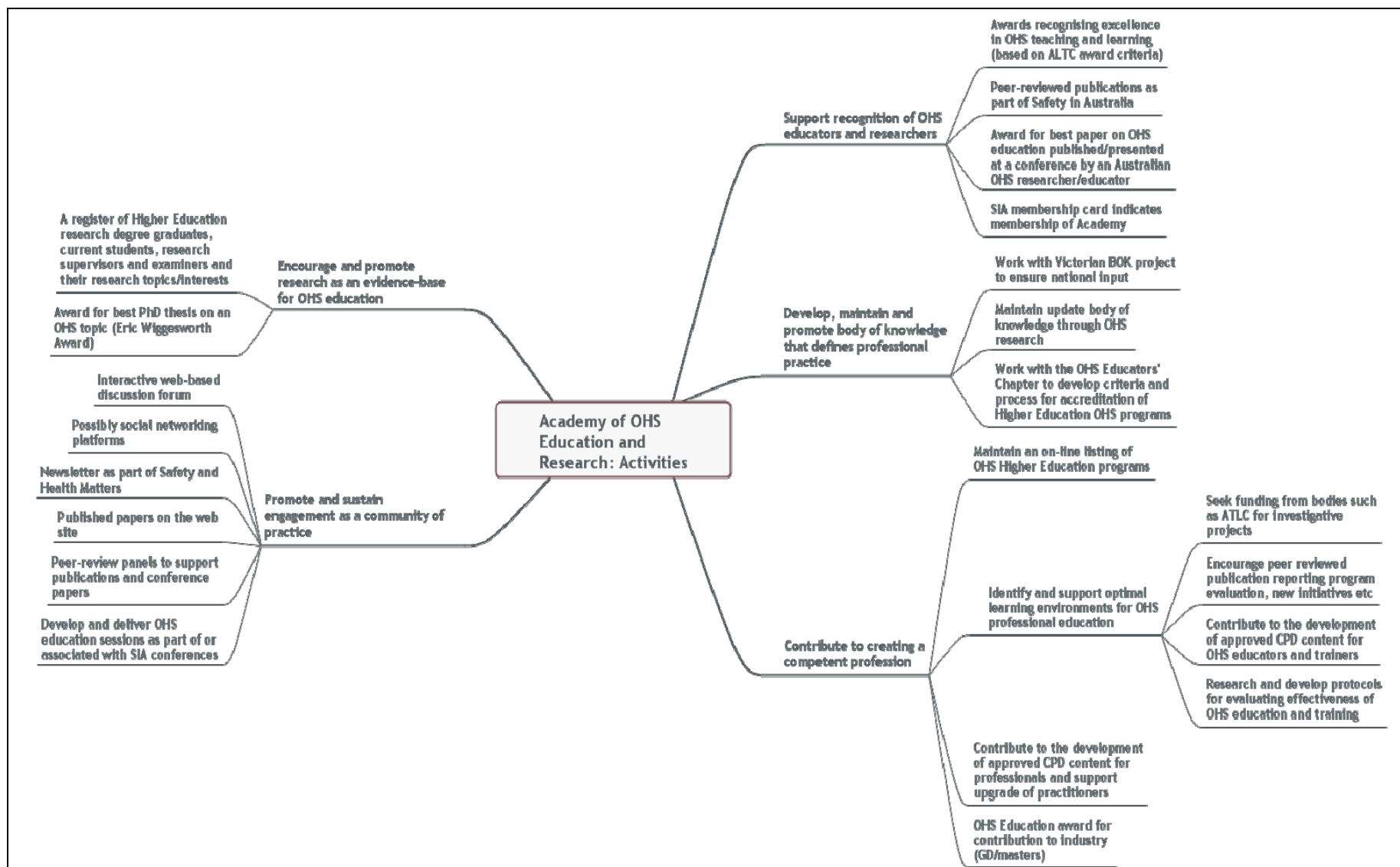


Table 7.2: CoP characteristics and how they might be expressed in the Academy of OHS Education and Research

CoP characteristic (adapted from Wenger, 1998)	<i>Proposition (Wenger, 1998)</i>	How the characteristic might be expressed	How the characteristic might develop in the short term via the common goal of defining the 'Body of Knowledge'
Joint enterprise	<i>Joint enterprise allows a community to extend the boundaries and interpretation of practice beyond those that were created. Sharing a common goal, members negotiate their situations in their reactions to them.</i>	The community has a common interest in OHS professional education and research; the challenge will be to transfer this common interest into a common, agreed goal. It is expected that joint enterprise may extend to sharing resources for supervising and examining postgraduate students and collaborative research.	The proposed 'Body of Knowledge' project will provide a focus where members of the group will be challenged to negotiate their situations and reactions both reflexively and with other group members.
Enterprise is substantially different from the original	<i>An essential characteristic of joint enterprise is the product that results from negotiation is substantially different from the original.</i>	There are many issues and challenges facing this group including determining whether there is/should be a philosophical underpinning of OHS education; if so, what is it? Is it universal or might it be different for different programs and different universities? Thus, the OHS education 'product' may well be different as a result of the group interaction.	The 'Body of Knowledge' project seeks to define the core knowledge required by independently practicing OHS professionals. The input of OHS educators nationally will be vital to this project and the outcomes will impact on all educators. This project will generate something that does not currently exist. The focused activity generated as part of this project may well establish the processes and practices to support discussion in other areas.
Disagreement	<i>Disagreements can be part of the joint enterprise as individuals may not necessarily hold the same viewpoint.</i>	The content and approach of current OHS education tends to reflect the skills and interests of the current lecturers and the philosophy of the individual university and/or faculty in which the program is placed. There will be disagreements but these should be valued as part of the exploratory process.	It is already apparent that there are different viewpoints on the required body of knowledge and on how it should be defined, and structured. It will be a test for this group as to whether the diversity of concepts and opinion adds to the richness of the product or becomes divisive.
Mutual accountability	<i>Through the empowerment of negotiated enterprise, there also develops a sense of mutual</i>	Development of this characteristic may be inhibited by competition between universities for students and funding. Some previous attempts	Mutual accountability for the main signatories is part of the 'Body of Knowledge' project with commitment to timelines and other deliverables.

CoP characteristic (adapted from Wenger, 1998)	<i>Proposition (Wenger, 1998)</i>	How the characteristic might be expressed	How the characteristic might develop in the short term via the common goal of defining the 'Body of Knowledge'
	<i>accountability. This refers to not only being part of the group and being responsible for one's own work but being personable, treating information and resources as something to be shared, being responsible to others by not making life harder for others.</i>	at collaboration were stalled as university administrations were not prepared to share student fees. Also, some individual lecturers may be protective of resources they have developed. However, the small numbers of OHS educators mean that mutual accountability may be essential for survival.	The management of these universities has been required to indicate their support. Similar requests to indicate support has been made by the funding body to other Australian universities. It may be that this mutual commitment to a common goal paves the way for more collaborative approaches.
Mutual engagement	<i>The members of a CoP are engaged in a common negotiated activity. Focus on activity allows the concept of practice not as an abstract entity but as the result of people being engaged in activities. Without mutual engagement, a community is more akin to a network of individuals or individual groups rather than a single CoP.</i>	Time for engagement has been identified as a challenge. This should be addressed by making membership of the community a 'have to have' by establishing processes that support promotion criteria such as peer-review and other recognition processes.	Engagement in the 'Body of Knowledge' process will require community members to participate in activities where they reflect on their own teaching practice and course content while considering and accommodating other views.
Means for meaningful engagement	<i>There must be a means for community members to engage meaningfully in shared activities.</i>	The community will be sustainable only if its members engage in activities such as discussion forums, peer-review panels, organisation of conferences and publication of papers.	The 'Body of Knowledge' project will be an initial test as to whether the educators can sustain the level of energy and interest expressed at the ALTC OHS Educators' Workshop to engage in the activities related to this project.
Maintain identities	<i>The result of the negotiated mutual engagement is that members maintain their identity, providing both complimentary and overlapping competencies to the group.</i>	Educators will be members of the community in their own right, not as members of the university. The universities may be invited to play an associate role through academic partnership.	It will be made clear that input to the 'Body of Knowledge' project is on a personal professional basis, not as justifying a particular university program. Universities may be invited to make submissions to the project but these will be clearly differentiated from those of individual academics.
Relationships form	<i>Finally relationships form amongst the members of a community.</i>	The university-based OHS educators are a small group; many are known to each other, some have worked together on projects, and some are friends. Patterns of informal communication at the ALTC OHS Educators'	The potential for developing relationships had been realised in Victoria where a small working group has been holding preliminary discussions on the 'Body of Knowledge.'

CoP characteristic (adapted from Wenger, 1998)	<i>Proposition (Wenger, 1998)</i>	How the characteristic might be expressed	How the characteristic might develop in the short term via the common goal of defining the 'Body of Knowledge'
		Workshop and, in some cases, follow-up since the workshop, demonstrate the importance many educators place on relationships. It is likely that the small number of OHS educators heightens this need.	
Shared repertoire	<i>Meaning is negotiated in a community through its shared repertoire. This repertoire refers to the fact that there is a pool of resources that members not only share, but also contribute to and therefore renew.</i>	It is anticipated that the shared repertoire will include resources for postgraduate supervision and examination, peer-review panels, a research register, and possibly teaching and learning materials.	Preliminary discussions on the 'Body of Knowledge' held by Victorian-based universities, and the relationships that have developed between those involved, have resulted in a one-day workshop where two universities shared information on current research projects.
Shared points of reference	<i>These shared points of reference provide a common discourse upon which members can create their own responses and ideas within the community.</i>	The shared domain, the community engagement, and the associated personal and group reflection should lead to individuals and the community crystallising their ideas and to the development of new ideas.	One of the members of the preliminary working party on the 'Body of Knowledge' gave a presentation at the ALTC OHS Educators' Workshop on how the discussions within that group had caused him to reflect on his own beliefs and practices related to OHS education.
New ideas created from the shared repertoire	<i>The shared repertoire common discourse is attained from a common history but should not impose a boundary. Members may renegotiate the common interpretations and ambiguities creating new ideas and trajectories.</i>	Due to small numbers of OHS staff and low priority given to OHS education by many universities, most OHS educators feel isolated and often disenfranchised. It is anticipated that once trust develops and discussion has begun on some core issues, the boundaries of interest and activity may broaden.	A desire to broaden boundaries may be both a benefit and an issue for the 'Body of Knowledge' project in that funding has been sought for a specific task but the need for a broader approach may become evident as the project progresses.

8. CONCLUSION

The broad aim of *Safeguarding Australians* – to facilitate alignment of OHS education with evolving workforce requirements – has been achieved with extensive stakeholder consultation. The voices of OHS professionals, university educators, graduates, and representatives of jurisdictional regulatory bodies and registered training organisations have been heard via a cyclic multi-phase process of data collection and analysis. Questions relating to three major themes identified in a review of literature relevant to university education of generalist OHS professionals – the integrity of the profession, student learning and the OHS ‘academy’ – were progressively refined in focus groups, survey questionnaires and in-depth telephone interviews. Mapping the content and delivery of OHS education at Australian universities involved exploring the disciplinary underpinning of current programs, and eliciting stakeholder expectations of the learning outcomes and underpinning curricula required for generalist OHS professional competency. Further insight resulted from identification of strengths, challenges and gaps in the delivery of OHS education as perceived by stakeholders. Assessment of the sustainability of the academy of OHS educators highlighted ominous negative influences. In an April 2009 ALTC OHS Educators’ Workshop, analysed data were presented for discussion and validation by stakeholders. At this workshop, Wenger’s (1998) notion of a ‘community of practice’ provided a fruitful perspective for discussing how OHS educators might engage for their own professional development and to strengthen OHS professional education.

8.1 Limitations

Initial lack of a cohesive group of Australian OHS educators

At the outset of this project, no identifiable group of OHS educators existed in Australia; although the Safety Institute of Australia had an OHS Educators’ Chapter, its membership comprised few university educators. Locating key

stakeholders within the higher education sector was difficult and time consuming because OHS educators have diverse primary-discipline backgrounds; out of necessity, there was heavy reliance on the personal contacts of project team members. The effort expended proved worthwhile; identification of these educators sparked a process that culminated in formation of the Academy of OHS Education and Research.

Nomenclature

During data collection, it became obvious that there was a lack of common understanding of a variety of key terms used in the description of activities and entities central to OHS education and practice. Terminology subject to different interpretations included OHS 'professional' versus 'practitioner'; OHS 'generalist' versus 'specialist;' 'subject' versus 'unit,' 'course' and 'program;' 'safety science,' 'tertiary education' and 'higher education.'

Project management

Initial difficulty in finding a suitable project manager impeded early planning and data collection. When this was resolved, coordinated implementation of data collection ensued.

Project leadership

Unexpected absence of the project leader, who was required to take unscheduled leave for seven months during the project, provided challenges during the data collection phase. After a short hiatus in research activity, the leadership role was shared effectively by two team members.

Geographical considerations

While the geographical distance between team members fortified the project's national representativeness, it also hindered ease and frequency of communication. The Safety Institute of Australia relieved the effects of this by providing assistance in the form of regular teleconferences and extra financial support for inclusion of Perth in the focus group schedule.

Recruitment of participants

Recruitment within some stakeholder groups was problematic. As noted above, the absence of an identifiable group of OHS educators complicated their recruitment. A more serious situation existed in relation to recruitment of graduates. Due to privacy considerations, a sample of graduates could only be sourced through educators who had maintained contact with alumni. The resultant small sample may not be representative of all graduates who completed undergraduate and/or postgraduate OHS programs in recent years. Representativeness may be an issue also for the sample of OHS professionals as it was limited to members of the Safety Institute of Australia.

Time frame

The project's limited time frame precluded comprehensive validation of the survey instruments. Instruments were reviewed by the project team and the stakeholder reference group, but wider validation was not possible.

8.2 Outcomes

The most significant and exciting project outcome with potential for massive positive impact on the future of OHS education in Australia is the formation of the Academy of OHS Education and Research. The existence of this academy is a direct result of the ALTC OHS Educators' Workshop – the first formal gathering of Australian OHS educators for many years. Workshop participants were overwhelmingly in favour of the academy as a community of practice; their 'Sydney Declaration' press release gave a glimpse into the potential for political traction that may result from uniting with a common purpose. The academy has been embraced by the Safety Institute of Australia and embedded within the OHS Educators' Chapter, with membership open to members of all affiliated OHS professional associations, including the Human Factors & Ergonomic Society of Australia, the Australian Institute of Occupational Hygienists, the Australian & New Zealand Society of Occupational Medicine Inc. and the Australasian Faculty of Occupational

Medicine. Importantly, the Safety Institute of Australia has committed to allocating the resources necessary for ongoing viability of the academy.

Formation of the Academy of OHS Education and Research provides a platform for driving relevant and responsive tertiary OHS education in Australia and, in terms of *Safeguarding Australians*, enhances achievement of all the project objectives.

Objective 1: To provide, through engagement with key stakeholders, a basis for identification and development of core learning outcomes from university-based OHS programs in Australia

It is apparent that OHS students have disparate educational experiences dependent on the curriculum and delivery choices of providers. Development of core learning outcomes will enhance the ability of universities to deliver consistent OHS education and facilitate a national approach. *Safeguarding Australians* has provided the basis for development of a core body of OHS knowledge. Paralleling this project, HaSPA has been funded by WorkSafe Victoria to define the core body of knowledge that will underpin a national OHS curriculum; the 'Body of Knowledge' project will be informed by the results of *Safeguarding Australians*.

Objective 2: To strengthen the discipline status of the profession while fully exploiting the multi-, inter- and trans-disciplinary interactions inherent in both practice and education

A true profession requires documented core values and discipline-relevant content to enable the transference of the practices, knowledge and skills to future professionals. University-based OHS education in Australia has been disparate in terms of its placement in a variety of more-traditional discipline areas within various schools and faculties. The survey of educators and workshop discussions revealed the location of OHS programs and the discipline base of current OHS educators to be very diverse. While this diversity may be seen as an impediment to gaining consensus on a core body of OHS knowledge, it can be appreciated as a great advantage to secure a cogent blend of knowledge and skills from the strengths of disparate

disciplines. The newly formed Academy of OHS Education and Research is well equipped to develop a core body of OHS knowledge that melds contributions from the various disciplines into quality OHS education. Without the current project and its workshop, OHS education in Australia would not now be on this course of development.

Objective 3: To identify optimal learning environments for desired graduate outcomes

This project identified three key requirements for delivery of desired OHS graduate outcomes. Firstly, undergraduate tertiary education has to be recognised as the entry-level qualification for generalist OHS professionals. Secondly, OHS undergraduate education programs need a multidisciplinary base. Finally, and possibly most importantly, a work-integrated learning model of education needs to underpin the curriculum design process. These requirements (discussed in more detail in section 8.2.1) will present significant challenges for the OHS Academy of Education and Research, especially in regards to overcoming barriers posed by current university planning approaches which emphasize large student cohorts, rigid discipline boundaries for degrees as opposed to interdisciplinary, and a 'one size fits all' curriculum design process.

Objective 4: To provide a model for interdisciplinary delivery of OHS education that can be transferred to other emerging professions

Impeded by time constraints and the complexity and challenges of current OHS education, this objective not fully realised in this project. However, *Safeguarding Australians* has provided the evidence base and the formalised 'community of practice' that, together, will enable development of an interdisciplinary-delivery model for OHS education with potential for transferral. Also, the project did identify some major challenges that other emerging professions may need to address in developing their own interdisciplinary models of professional education. These include:

- How will the identification of specific members of the profession be facilitated, e.g educators, practitioners?

- What will be the role of the professional body in professional education?
- What will be role of regulators with regards to the profession?
- What is the core body of knowledge of the profession? Can it be distinguished from a wider body of knowledge?
- How will the accreditation of educational programs to meet professional practice requirements of the profession be addressed?

These areas require further development for OHS and in association with other emerging disciplines via the stakeholder groups, ALTC networks and grant schemes.

8.2.1 Guidelines for the future sustainable development of university education for generalist OHS professionals

Generalist OHS professionals need university education

Both undergraduate and postgraduate OHS education programs are producing valuable OHS professionals; however, it is clear that the majority of existing programs are directed at the postgraduate market. While postgraduate programs tend to be more management focused, undergraduate programs provide an opportunity for students to build a foundation of 'traditional discipline' knowledge overlaid with 'OHS discipline' knowledge. The current trend for education of potential OHS professionals comprises several years of OHS workplace experience, a vocational qualification (a diploma in OHS) followed by a postgraduate qualification. Postgraduate programs have been retro-fitting to accommodate this trend. The Academy of OHS Education and Research, the professional association (Safety Institute of Australia), regulators, and industry need to work together to ensure that undergraduate OHS degrees are held in high regard as valid entry-level qualifications for generalist OHS professionals.

Generalist OHS professionals need a multidisciplinary grounding

There is no clear 'traditional' discipline base for current OHS education, nor is there a clear indication of any single disciplinary base for preferred future

education. OHS professionals need grounding in all 'traditional' disciplines to be competent in the OHS discipline. OHS has to be reinforced as a discipline in its own right whilst acknowledging that it is engaged primarily in transdisciplinary problem solving. While it does not currently have its own original and exclusive base knowledge, OHS education is a purposeful transdisciplinary blend of 'traditional' discipline elements designed to meet the needs of knowledge generation and problem identification and solution. The need to identify and develop a specific core body of knowledge for OHS education has been recognised by both *Safeguarding Australians* and initiatives of HaSPA and the jurisdictional regulator in Victoria. The development of a core body of knowledge for OHS education is a logical extension of this project and is fully supported by the project team.

Generalist OHS professionals need a work-integrated learning model of education

There was unanimous agreement among stakeholders that tertiary OHS educational programs must provide both formal knowledge and real-world experience outcomes. A work-integrated learning model of education would meet this need and provide graduates with both the knowledge and the experience that employers want. Work-integrated learning is "an umbrella term used for a range of approaches and strategies that integrate theory with the practice of work within a purposefully designed curriculum" (Patrick et al., 2008). This educational approach offers several advantages for both OHS education and the OHS profession. Firstly, it allows the development of a flexible curriculum that can meet the expectations various stakeholders have expressed about learning outcomes from OHS programs. Secondly, its underpinning framework of authentic learning and professional engagement means it can be located within and/or across any number of faculties. Finally, successful work-integrated learning requires the involvement of multiple stakeholders in its development and implementation. This involvement should serve to increase dialogue, interaction and understanding between the Academy of OHS Education and Research, regulators and the Safety Institute of Australia, and to raise the profile of the OHS profession.

REFERENCES

- Abraham, A. (2007). Student centred teaching of accounting to engineering students: Comparing blended learning with traditional approaches. In R. Atkinson, C. McBeath, A. Soong Swee Kit & C. Cheers (Eds), *ICT: Providing choices for learning* (pp. 1-9). Singapore: ASCILITE.
- Acar, B. S. (2004). Analysis of an assessment method for problem-based learning. *European Journal of Engineering Education*, 29(2), 231-240.
- Assogbavi, T. (2005). Addressing a missing link in higher education on-line content development: Toward a tri-partite collaborative model. *Journal of College Teaching & Learning*, 2(9), 43-52.
- Athanasou, J. A. (2005). Self-evaluations in adult education and training. *Australian Journal of Adult Learning*, 45(3), 290-303.
- Australian Bureau of Statistics (ABS). (2006). *6324.0 Work-related injuries, Australia, 2005-06*. Retrieved August 8, 2009, from <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6324.0>
- Australian Safety and Compensation Council (ASCC). (2009). *The cost of work-related injury and illness for Australian employers, workers and the community: 2005-06*. Canberra: Commonwealth of Australia.
- Barron, B. J. S. (1998). Doing with understanding: Lessons from research on problem- and project-based learning. *Journal of Learning Sciences*, 7(3 & 4), 271-311.
- Bennett, S. (2009). Submission for funding: Development and implementation of the body of knowledge for generalist OHS professionals. Melbourne: Health and Safety Professionals Alliance.
- Blair, E. H. (1997). *Occupational health and safety management competencies as perceived by certified safety professionals and safety educators*. Lexington: University of Kentucky.
- Bluff, L. (2006). *Regulating the OHS support role*. Paper presented at the Safety In Action Conference, Melbourne.
- Borys, D. (2008). The core body of OHS knowledge: A report on work to date. Safety Institute of Australia.
- Borys, D., Else, D., Pryor, P., & Sawyer, N. (2006). Profile of an OHS professional in Australia in 2005. *Journal of Occupational Health & Safety - Australia & New Zealand*, 22(2), 175-192.

- Brun, J. P., & Loiselle, C. D. (2002). The roles, functions and activities of safety practitioners: the current situation in Quebec. *Safety Science*, 40, 519-536.
- Candy, P. (2000). *Learning for life: Preparing occupational health and safety practitioners for the 21st century*. Paper presented at the Safety In Action Conference, Melbourne.
- Capra, M.F. (2006) The future of OHS education: a time to bring all parties together. *Journal of Occupational Health & Safety - Australia & New Zealand*, 22(4), 283-286.
- Carr, W., & Kemmis, S. (1986), *Becoming critical: education, knowledge and action research*. Farmer Press: London.
- Cestone, C. M., Levine, R. E., & Lane, D. R. (2008). Peer assessment and evaluation in team-based learning. *New Directions for Teaching & Learning*, 116(Winter), 69-77.
- Connell, J. (2003). Orientation for adult learners in problem-based learning. *Australian Journal of Adult Learning*, 43(1), 86-100.
- Cowley, S. (2006). *OH&S in small business: Influencing the decision makers*. Ballarat: University of Ballarat.
- Davis, H. C., & Hill, K. (2007). Embedding blended learning in a university's teaching culture. *British Journal of Educational Technology*, 38(5), 817-828.
- Dawson, S., Poynter, P., & Stevens, D. (1984). Safety specialists in industry: roles, constraints and opportunities. *Journal of Occupational Behaviour*, 5, 252-270.
- Deignan, T. (2009). Enquiry-based learning: Perspectives on practice. *Teaching in Higher Education*, 14(1), 13-28. Retrieved April 2, 2009, from <http://dx.doi.org/10.1080/13562510802602467>
- Department of Employment and Workplace Relations. (2006). *Australian jobs 2006*. Canberra: Australian Government.
- Dwyer, T. (1992). The industrial safety professionals: A comparative analysis from World War 1 until the 1980s. *International Journal of Health Services*, 22(4), 705-727.
- Eckenfelder, D. J. (1998). Professional prosperity: The narrowing road. *Professional Safety*, 43(6), 32-36.
- Fowler, B., Sauer, K., Shaw, T., & Phillis, D. (1998). Tertiary qualifications in occupational health and safety are now required by most employers.

Journal of Occupational Health & Safety - Australia & New Zealand, 14(1), 73-80.

Gallie, K., & Joubert, D. (2004). Paradigm shift: From traditional to online education. *Studies in Learning, Evaluation, Innovation & Development*, 1, 32-36. Retrieved November 20, 2008, from <http://sleid.cqu.edu.au>

Gardner, D., & Hall, R. (2001). Web-based training for OHS professional: some issues. *Journal of Occupational Health & Safety - Australia & New Zealand*, 17(6), 625-631.

Gunawardena, C., Hermans, M. B., Sanchez, D., Richmond, C., Bohley, M., & Tuttle, R. (2009). A theoretical framework for building online communities of practice with social networking tools. *Educational Media International*, 46(1), 3-16.

Guri-Rosenblit, S. (2005). 'Distance education' and 'e-learning': Not the same thing. *Higher Education*, 49, 467-493.

Hale, A. R., & Guldenmund, F. G. (2006). *Role and tasks of safety professionals: Some results from an international survey*. Paper presented at the Safety In Action Conference, Melbourne.

Health and Safety Professionals Alliance (HaSPA). (2008). *Victorian code of ethics and minimum service standards for professional members of OHS associations*. Melbourne: WorkSafe Victoria.

Herr, K., & Anderson, G. L. (2005). *The action research dissertation: A guide for students and faculty*. California: Sage.

Herrington, J., & Oliver, R. (2002). *Designing for reflection in online courses*. Paper presented at the Higher Education Research and Development Society of Australasia (HERDSA).

Hmelo, C. (1998). Problem-based learning: Effects on the early acquisition of cognitive skill in medicine. *Journal of the Learning Sciences*, 7(2), 173-208.

Institute of Occupational Safety and Health (IOSH). (2006). *Higher level qualification accreditation*. Leicestershire, UK.

Joubert, D., & Toft, Y. (2006). *Creating a new generation of OHS professionals*. Paper presented at the Visions 2006 Conference, Safety Institute of Australia.

Keleher, P., Toft, Y., Joubert, D., & Howard, P. (2006, June/July). *Enhancing the student learning experience by developing on-line delivery skills for industry practitioner lecturers*. Paper presented at the European Society for Engineering Education (SEFI), Uppsala, Sweden.

- Kinnaird, R. (2008). Report on Queensland OHS Workforce. [Yet to be published.]
- Knight, P. (2004). Assessment of complex learning: The Engineering Professors' Council's new thinking about first-cycle engineering degrees. *European Journal of Engineering Education*, 29(2), 183-191.
- Koh, G., Khoo, H. E., Wong, M. L., & Koh, D. (2008). The effects of problem-based learning during medical school on physician competency: A systematic review. *Canadian Medical Association Journal*, 178(1), 34-41.
- Le, K. N., & Tam, V. (2007). A survey on effective assessment methods to enhance student learning. *Australasian Journal of Engineering Education*, 13(2), 13-19.
- Lilje, O., & Peat, M. (2007, September 27-28). *Use of traditional and e-learning components in a blended learning environment*. Paper presented at the Symposium on Science teaching and learning research including threshold concepts, Sydney.
- Mayhew, C., & Peterson, C. L. (Eds). (1999). *Occupational Health and Safety in Australia*. Sydney: Allen & Unwin.
- Michaelsen, L. K., & Sweet, M. (2008). The essential elements of team-based learning. *New Directions for Teaching & Learning*, 166(Winter), 7-27.
- Mills, J., & Treagust, D. (2003). Engineering education - is problem-based or project-based learning the answer? *Australasian Journal of Engineering Education*. Retrieved June 25, 2007, from http://www.aaee.com.au/journal/2003/mills_treagust03.pdf
- Moodie-Bain, D. (2003). *What do Australian employers want in an occupational health & safety professional?* Hong Kong: Safety & Health Conference.
- National Occupational Health and Safety Commission (NOHSC). (1994). *Guidance note for the development of tertiary level courses for professional education in occupational health and safety*. Canberra: Australian Government Publishing Service.
- National Occupational Health & Safety Commission (NOHSC). (1999). *Comparative study of approaches to community safety and health awareness campaigns*. Canberra: NOHSC.
- National Occupational Health & Safety Commission (NOHSC). (2002). *National OHS Strategy 2002-2012*. Canberra: Commonwealth of Australia.

- National Occupational Health & Safety Commission (NOHSC). (2004). *The cost of work-related injury and illness for Australian workers, employers and the community*. Canberra: NOHSC.
- Nelson, L. (1994). Managing managers in occupational health and safety. *Asia Pacific Journal of Human Resources*, 32(1), 13-28.
- Oerlemans, K., May, E., & Hurle, B. (2007). *Piloting online learning in engineering education*. Paper presented at the Australian Association for Research in Education, Fremantle.
- Palmer, S. (2004). Authenticity in assessment: Reflecting undergraduate study and professional practice. *European Journal of Engineering Education*, 29(2), 193-202.
- Parsons, D. (2007). Encouraging learning through external engineering assessment. *Australasian Journal of Engineering Education*, 13(2), 21-29.
- Pasole, S., & Awalt, C. (2008). Team-based learning in asynchronous online settings. *New Directions for Teaching & Learning*, 116(Winter), 87-95.
- Pisaniello, D. G. R. (1998). *Critical thinking in OHS education*. Paper presented at the Fourth Annual Conference of the Australian and NZ OHS Educators, Brisbane.
- Poon, P. S. K. (1998). *An issue-based framework for open learning in safety education and professional development*. Paper presented at Open Learning 98, the Third International Conference on Open Learning, Queensland Open Learning Network, Brisbane.
- Powell, P. (2004). Assessment of team-based projects in project-led education. *European Journal of Engineering Education*, 29(2), 221-230.
- Pryor, P. (2004, April). *OHS professional education in Australia in 2004 and beyond*. Paper presented at the IOSH Conference: Growing Professionally - Developing Influence, Harrogate, United Kingdom.
- Pryor, P. (2006). *Profile of an OHS professional in Australia and implications for achievement of the National OHS Strategy 2002-2012*. Paper presented at the Safety in Action Conference, Melbourne.
- Pryor, P. (2008). *Towards an understanding of the strategic influence of the occupational health and safety professional*. Ballarat: University of Ballarat.
- Quinlan, M. (Ed.). (1995). *Tertiary education in occupational health and safety in Australia and New Zealand*. Kensington, NSW: University of New South Wales.

- Quinlan, M., & Bohle, P. (1991). *Managing occupational health and safety in Australia*. Melbourne: Macmillan Education Australia.
- Safesearch. (2008). *Health safety and environment remuneration survey 2007/2008*. Melbourne: Safesearch.
- Safety Institute of Australia (SIA). (2001). The Safety Institute of Australia - Promoting professionalism through safety education. Application for the WorkCover Victoria Health and Safety Awards. Melbourne: SIA.
- Safety Institute of Australia (SIA). (2009, February 18). *Safety Week*. National Board of Management Update.
- Sanson-Fisher, R. W., & Lynagh, M. C. (2005). Problem-based learning: A dissemination success story? *Medical Journal of Australia*, 183(5), 258-260.
- Sibley, J., & Parmelee, D. X. (2008). Knowledge is no longer enough: Enhancing professional education with team-based learning. *New Directions for Teaching & Learning*, 116(Winter), 41-53.
- Smith, G. G., Ferguson, D., & Caris, M. (2001). Teaching college courses online vs face-to-face. *THE Journal*, 28(9), 18-25.
- Spickett, J. T. (1999). Occupational health and safety curricula: The factors that decide - an Australian experience. *Journal of Occupational Medicine*, 49, 419-422.
- Stewart-Crompton, R., Mayman, S., & Sherriff, B. (2009). *National review into model occupational health and safety laws*. Second report to the Workplace Relations Ministers Council. Retrieved February 18, 2009, from <http://www.nationalohsreview.gov.au/>
- Sweeney Research. (2008). *General public segmentation initial findings*. Melbourne: WorkSafe Victoria.
- Swuste, P., & Arnoldy, F. (2003). The safety/advisor manager as agent of organisational change: A new challenge to expert training. *Safety Science*, 41, 15-27.
- Toft, Y. (2007, March). *An inter and transdisciplinary learning and teaching case study: Creating designs 'fit' for people*. Paper presented at the Discipline-Based Learning Forum, Hobart.
- Toft, Y., Trott, D., & Keleher, P. (2006). *Online communities of practice: Can first year students really establish a 'feeling of belonging' at distance or is this more 'e' hot air?* Paper presented at the 17th Annual conference of the Australasian Association for Engineering Education. Creativity, Challenge, Change - Partnerships in Engineering Education, Auckland.

- Turbill, J. (2002, December 8-11). *From face-to-face teaching to online distance education classes: Some challenges and surprises*. Paper presented at Winds of Change in a Sea of Learning: Charting the Course of Digital Education, the 19th Annual Conference of the Australasian Society for Computers in Learning in Higher Education (ASCILITE), Auckland.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.
- Willey, K., & Freeman, M. (2006). Improving teamwork and engagement: The case for self and peer assessment. *Australasian Journal of Engineering Education*. Retrieved June, 2007, from <http://aaee.com.au/journal/2006/willey0106.pdf>
- Williams, S. L. (2006). The effectiveness of distance education in allied health science programs: A meta-analysis of outcomes. *American Journal of Distance Education*, 20(3), 127-141.
- Winder, C., & Abdullah, D. (2004). A survey of OHS courses offered by Australian Universities. *Journal of Occupational Health & Safety - Australia & New Zealand*, 20(5), 445-457.
- WorkSafe Victoria. (2008). *Employing or engaging suitably qualified persons to provide health and safety advice*. Melbourne: WorkSafe Victoria.

APPENDICES

Appendix 1: Activities of the OHS professional

Appendix 2: Invitation to participate in focus group

Appendix 3: Questions for initial round of focus groups with OHS educators, regulators and professionals

Appendix 4: Survey questionnaires for OHS professionals, educators, regulators and graduates

Appendix 5: OHS educator interview questions

Appendix 6: ALTC OHS Educators' Workshop discussion themes

Appendix 7: Views expressed by interviewed OHS educators about OHS teaching and learning

Appendix 8: Views expressed by interviewed OHS educators about the challenges facing OHS education in Australia

Appendix 1: Activities of the OHS professional

Both the content and the teaching and learning methodologies employed in OHS professional education should be informed by the activities of practicing OHS professionals. This may be considered from two perspectives: what a practicing OHS professional actually does and what they should do.

The answer to the first question is informed by a major international research project (Hale & Guldenmund, 2006) with the Australian results reported by Borys, Else, Pryor and Sawyer (2006). The second question is addressed by considering the priorities set in the *National OHS Strategy 2002-2012* (NOHSC, 2002) and selected literature.

Actual activities of practicing OHS professional

From 2002 to 2004, data was collected across 12 countries (10 European countries including the United Kingdom, Australia and Singapore) via a survey asking OHS professionals about the activities in which they were involved. The questions covered demographic information, tasks performed and their frequency, hazards encountered and dealt with, and people with whom they engaged. Each country used the same questionnaire with minor contextualisation to suit the particular country's OHS culture. Where required, the questionnaire was translated, with back translation, to ensure consistency. A total of 5495 responses were obtained with response rates varying from 5-60%. There were 634 respondents from Australia, a response rate of 40%.

For the purposes of this report a list of 'core' activities together with 'sub-core' activities has been constructed for both the international and Australian data. This activity profile was developed by going back to the percentage results in the collated data, which was made possible by the agreement of the original researchers in both the international and the Australian studies¹.

Table 1 presents the core and sub-core activities for practicing OHS professionals across all countries, with Table 2 presenting that for Australian OHS professionals. For the international profile, the core is defined as the activities carried out by more than 80% of professionals in more than seven of the 12 participating countries. The sub-core is the activities carried out by more than 60% of respondents in more than eight of the 12 countries. Similarly the core of the Australian profile includes activities reported to be carried out by more than 80% of respondents at some time, with the sub-core being activities carried out by 60-80% of respondents at some time. The Australian profile also includes a 'hard core' of activities carried out by more than 60% of respondents at least quarterly. In each case the hazards, tasks and contacts are listed in descending order of frequency of response. The descriptions in the profile are limited by the design and wording of the original questionnaire which was set by the European Network of Safety and Health Practitioner Organisations (ENSHPO).

¹ The international comparison was enabled by Professor Andrew Hale and Frank Guldenmund of the Delft University of Technology. The Australian analysis was made possible by the agreement of the original co-authors Dr David Borys, Professor Dennis Else and Neroli Sawyer of the University of Ballarat, and Pam Pryor.

Table 1: Core and sub-core activities for OHS professionals (International)

Core > 7 of the 12 countries where >80% of respondents carry out the task at some time		
Hazards dealt with	Tasks	Contacts
Working posture Lifting Falls Machinery and installations Noise Human error Electricity	<ol style="list-style-type: none"> 1. Investigate and evaluate workplace or plant risks. 2. Specify and check compliance of safety measures for machines, processes or workplaces. 3. Perform job safety analyses. 4. Prepare policy on PPE, specify which PPE to purchase and monitor correct use. 5. Check legal compliance of OHS policy or procedures. 6. Investigate incidents and accidents. 7. Conduct safety training. 8. Conduct inspections of physical prevention measures. 9. Conduct audits of safe behaviour. 10. Prepare and maintain policy on emergency preparedness. 11. Carry out risk analysis on projects, designs and activities. 	Inform/discuss risk and safety measures with: <ul style="list-style-type: none"> • employees • first line supervisors • line managers • top management • health and safety representatives Contact: <ul style="list-style-type: none"> • Government inspector • Personnel department • Technical/maintenance service

Sub-core > 8 of the 12 countries where >60% of respondents carry out the task at some time		
Hazards dealt with	Tasks	Contacts
Lighting Fire Cold or heat VDUs Vehicles Toxic and carcinogenic substances Explosion	<ol style="list-style-type: none"> 1. Lead or advise on organisational change to improve safety performance. 2. Prepare company SMS. 3. Prepare policy on safety culture, assess safety culture and propose improvements. 4. Keep statistics about incidents and accidents and make recommendations for improvement arising from investigations. 5. Design/improve safety procedures and check compliance for use and storage of dangerous goods. 6. Prepare company policy relating to safety training. 7. Design and implement a safety campaign and publish information about safety. 	<ul style="list-style-type: none"> • Visitors • Quality Department • Occupational physician • Financial Division

Table 2: Core and sub-core activities for OHS professionals (Australia)

Core >80% of respondents carry out the task at some time			Sub Core 60-80% of respondents carry out the task at some time		
Hazards dealt with	Tasks	Contacts	Hazards dealt with	Tasks	Contacts
Working posture Lifting Falls Machinery and installations Noise Human error Electricity	<ol style="list-style-type: none"> 1. Investigate and evaluate workplace or plant risks. 2. Specify and check safety measures for machines, processes or workplaces. 3. Perform job safety analyses. 4. Prepare policy on PPE, specify which PPE to purchase and monitor correct use. 5. Check legal compliance of OHS policy or procedures. 6. Investigate incidents and accidents. 7. Conduct safety training. 8. Conduct inspections of physical prevention measures. 9. Conduct audits of safe behaviour. 10. Prepare and maintain policy on emergency preparedness. 11. Carry out risk analysis on projects, designs and activities. 	<p>Inform/discuss risk and safety measures with:</p> <ul style="list-style-type: none"> • employees • first line supervisors • line managers • top management • health and safety representatives <p>Contact:</p> <ul style="list-style-type: none"> • Government inspector • Personnel department • Technical/ maintenance service 	Lighting Cold or heat Explosions Fire Toxic and carcinogenic substances Other occupational disease Alcohol and drugs Bullying and harassment Biological hazards Vibration Road/transport safety External safety Explosions	<ol style="list-style-type: none"> 1. Prepare policy on safety culture and assess culture and recommend improvements. 2. Design performance indicators for the SMS. 3. Conduct audits of safe behaviour. 4. Document SMS. 5. Prepare policy on PPE, specify which PPE to purchase and monitor correct use. 6. Prepare and maintain policy and procedures for emergency preparedness. 7. Develop policy on sustainability of processes or products. 8. Prepare policy on safety training. 9. Prepare or contribute to annual plan and annual report on safety. 10. Design and implement a safety campaign and publish information about safety. 11. Keep statistics about accidents and incidents. 12. Be involved as a member of a design team. 	<ul style="list-style-type: none"> • Financial Division • Ergonomist • Educational establishment • Occupational hygienist • Lawyer • Trade union official • Occupational physician • Quality Department

'Hard' core

>60% of respondees carry out the task at least quarterly

Hazards dealt with	Tasks	Contacts
Lifting Working posture Human errors Other physical workload Falls	<ol style="list-style-type: none">1. Investigate and evaluate workplace or plant risk.2. Conduct workplace inspections.3. Perform job safety analyses.4. Propose improvements to the SMS.5. Check whether company policies or procedures confirm to legislation.6. Specify safety measures and check compliance with safety procedures for machines, processes or workplaces.7. Investigate incidents and make recommendations for improvement.8. Give safety training programs.9. Carry out risk analyses of projects, designs or activities.10. Monitor functioning of SMS.	Inform/discuss risk and safety measures with: <ul style="list-style-type: none">• employees• first line supervisors• line managers• top management• safety representatives

The *Safety Professionals' Task Questionnaire* and the activity profiles described in Table 1 and Table 2 refer to the actual tasks carried out by OHS professionals both in Australia and internationally. It does not necessarily follow that this is what OHS professionals should be doing. The following section examines the strategic direction of OHS in Australia and whether this profile of activities supports that direction and so the implications for OHS professional education.

Desired activity profile for OHS professionals

In 2002 the Australian Workplace Relations Ministers' Council (WRMC) endorsed the National OHS Strategy which was to set the priorities for OHS activity in Australia for the next ten years. These priorities are to reduce high incidence/high severity risks; improve the capacity of business and workers to manage OHS effectively; prevent occupational disease more effectively; eliminate hazards at the design stage; strengthen the capacity of government to influence OHS outcomes (National Occupational Health and Safety Commission, 2002).

Pryor (2006) applied the results of the *Safety Professionals' Task Questionnaire* to examine whether the current activities of OHS professionals in Australia supported these strategic priorities. Pryor's analysis suggests that the current role and activities of OHS professionals is not being optimised to support achievement of the National Strategy. Some outcomes, such as the finding that OHS professionals are most often involved in a people-focused approach on human error and compliance issues and implementing procedural and PPE solutions, are contrary to the philosophy of most modern approaches to OHS risk management. They are also probably contrary to the principles underpinning the education of the OHS professional. OHS professionals are supporting adoption of systematic approaches to managing safety at a functional level but their input at the strategic business level is often limited, or not even considered part of their role. This lack of strategic focus by OHS professionals may be limiting achievement of the national OHS targets as a recent review notes only limited improvement (Australian Safety and Compensation Council, 2005).

Table 3 shows the discrepancies between the activities of the OHS professional and the national priorities.

Table 3: Discrepancies between activities of OHS professionals and national OHS priorities

National priority	Activity of OHS professional
Reduce high incidence/severity risks	<ul style="list-style-type: none"> • Some priority industries have little access to specialist advice • High consequence risks receive little attention
Improve capacity of business operators and workers to manage OHS	<ul style="list-style-type: none"> • Middle managers and workers receiving specialist technical advice but not top management and not on strategic issues
Prevent occupational disease more effectively	<ul style="list-style-type: none"> • Causes of diseases receive little attention
Eliminate hazards at the design stage	<ul style="list-style-type: none"> • Low involvement in design and planning • Focus on low level controls
Strengthen capacity of government to influence OHS	

The question arises as to the reason for this lack of strategic focus for the activity of the OHS professional. Is it an outcome of the education of the OHS professional? Is the OHS professional responding to workplace and organisational pressures? Is it because the OHS professional does not have the skills and attributes to operate at a strategic level and to set the agenda rather than just respond?

Other writers have commented on the lack of management integration of the activities of the OHS professional. Blewett and Shaw (1996) advised the OHS professional to become an internal consultant; creating awareness, building OHS infrastructure; providing information and supporting managers to develop OHS skills and knowledge. This emphasis on the "management consultant" role was reinforced by Brun and Loisel (2002) who recommended that the OHS professional should change from a technical expert to a generalist with strong human relations and management skills. This recognition of the need for management and communication skills was also recognised in the USA (Blair, 1997; Eckenfelder, 1998; Nelson, 1994).

Despite these recommendations made in the 1990s and early 2000s for the OHS professional to become more management oriented and to develop communication and management skills Table 1 and Table 2 show that in 2005 that the core tasks reflect a conventional view of the technically oriented OHS professional not far removed from the view of 50 years ago (Hale & Guldenmund, 2006). Further analysing this data Pryor (in press) found that, while there may be a number of interpretations of the data, the majority of OHS professionals have regular communication with senior managers, the focus of their activities is mainly task-oriented and, less often, operational activities around the management system with a few activities that may be considered strategic. The problem is not unique to Australia. On several measures the European, Singaporean and, to a lesser extent, UK OHS professionals engage less with senior managers and on strategic activities than do Australian OHS professionals. However the Australian OHS professional is less likely to be involved in business and planning activities than are their international counterparts.

Summary

OHS professional education should prepare the graduate with the required technical knowledge but also must equip them with the management, communication and change management skills to enable them to interact with senior managers and other workplace personnel to ensure that their professional activities are directed at strategic, long term improvement in OHS policy and practice and reduction in risk. Examination of the current activity profile of the OHS professional indicates that current education of OHS professionals may not be meeting this requirement.

References

- Australian Safety and Compensation Council. (2005). *National OHS strategy 2002-2012*. Canberra: Australian Safety and Compensation Council.
- Blair, E. H. (1997). *Occupational health and safety management competencies as perceived by certified safety professionals and safety educators*. University of Kentucky, Lexington.

- Blewett, V., & Shaw, A. (1996). The OHS professional: manager of change or changing manager? *Journal of Occupational Health & Safety - Australia & New Zealand*, 12(1), 49-54.
- Borys, D., Else, D., Pryor, P., & Sawyer, N. (2006). Profile of an OHS professional in Australia in 2005. *Journal of Occupational Health & Safety - Australia & New Zealand*, 22(2), 175-192.
- Brun, J. P., & Loisele, C. D. (2002). The roles, functions and activities of safety practitioners; the current situation in Quebec. *Safety Science*, 40, 519-536.
- Eckenfelder, D. J. (1998). Professional prosperity: The narrowing road. *Professional Safety*, 43(6), 32-36.
- Hale, A. R., & Guldenmund, F. G. (2006). *Role and tasks of safety professionals: Some results from an international survey*. Paper presented at the Safety In Action Conference, Melbourne.
- National Occupational Health and Safety Commission. (2002). *National OHS strategy 2002-2012*. Canberra: Commonwealth of Australia.
- Nelson, L. (1994). Managing managers in occupational health and safety. *Asia Pacific Journal of Human Resources*, 32(1), 13-28.
- Pryor, P. (2006). *Profile of an OHS professional in Australia and implications for achievement of the National OHS Strategy 2002-2012*. Paper presented at the Safety in Action Conference, Melbourne.
- Pryor, P. (in press). The OHS professional: Technician or strategic advisor?

Appendix 2: Invitation to participate in focus group

Dear NAME,

We would like to invite you to participate in a Focus Group as part of a Australian Learning and Teaching Council Discipline Based Initiative education grant: "Safe Guarding Australians: Mapping the strengths, challenges and gaps toward sustainable improvements in learning outcomes from diverse models of OHS education."

Essentially the ALTC Grant seeks to improve tertiary-based OHS education in Australia.

The teaching of both Undergraduate (UG) and Postgraduate (PG) programs in Australian universities has not been unified and there is no industry or professional association requirements for curriculum. While most universities have similar content within UG and PG programs there is considerable variation in the time spent on core issues and indeed there is no fixed agreement on what should constitute core OHS content.

The ALTC grant which has been awarded to a consortium of Universities (Central Queensland University [lead organisation], Curtin University of Technology, University of Ballarat, University of Southern Queensland, University of Queensland and University of Western Sydney) and the Safety Institute of Australia seeks:

- To provide, through engagement with key stakeholders, a basis for the identification and development of core curriculum in all university based entry level OHS programs in Australia.
- To strengthen the discipline status of the profession while fully exploiting the multi-, inter- and trans-disciplinary interactions inherent in both practice and education.
- To identify optimal learning environments for desired graduate outcomes.
- To provide a model for interdisciplinary delivery of OHS education that can be transferred to other emerging professions.

An important aspect of the grant is to seek the opinions of OHS professionals and educators in relation to OHS curriculum, the requirements of industry and the challenges ahead for OHS education in a changing world.

It is within this context that this invitation has been issued. The focus groups will be held at INSERT TIME on INSERT DATE and immediately precede the SIA conference in LOCATION. The venue is yet to be determined, but information will be forwarded to you upon acceptance of this invitation.

While your expertise and opinions are being earnestly sought to inform the ALTC research, unfortunately the terms of grant do not allow funding for participants.

I hope that you are able to accept this invitation and contribute to the development of OHS education in Australia. Please respond to this email by INSERT DATE to inform of your acceptance/non acceptance of this invitation.

If you have any queries about the focus groups or the research grant, please contact INSERT CONTACT DETAILS.

Kind regards
NAME
Research team

Appendix 3: Questions for initial round of focus groups with OHS educators, regulators and professionals

OHS educator questions

1. What do you expect that a competent OHS professional should be able to do?
2. How can the scholarship of learning and teaching, related to OHS education, be best supported and enhanced?
3. What are the graduate characteristics required at each qualification level?
4. What are the appropriate curriculum models to deliver learning outcomes?
5. What are the appropriate assessment models and methods at each qualification level?
6. What are the optimal learning environments to enhance the inclusivity of diverse student populations and learning outcomes?
7. What are the appropriate qualifications and experience levels for OHS Educators?
8. How can we build human resource capacity to ensure the enhancement and continuity of the OHS academy?
9. What is the 'community of practice' in OHS, how can this be defined?

OHS regulator questions

1. Does WorkSafe have a formal position on the role of OHS professionals?
2. Does WorkSafe have a formal position on educational qualifications of OHS professionals?
3. What do you expect that a competent OHS professional should be able to do?
4. What is the basic knowledge a competent OHS professional should have , e.g. science, management, behavioural, health based?
5. How important do you think knowledge learning is compared with experiential learning?
6. What are the skills and attributes a competent OHS professional should have?
7. Should the entry level requirement for an OHS professional be UG, PG, or vocational?
8. What is Worksafe doing to promote the profile of the OHS professional or to promote OHS as a career?
9. What is Worksafe doing to support the education of OHS professionals e.g. scholarships, cadetships, work experience, interaction with industry to facilitate student placements, guest lecturers?
10. Do you have any direct input into curriculum development or lecturing?
11. Are they happy with the way OHS practitioners are being taught at Australian universities? If not why?
 - What do they feel needs to have more emphasis on in uni courses with regards to the main discipline areas usually included in OHS
 - Risk management/safety
 - Occupational Hygiene
 - Ergonomics
 - Others e.g.: law, OHS management. ??
 - Are they happy with the level of skills on entry into the workplace?
12. What is the regulator doing to promote OHS research?
13. Is there anything else that you would like to add and anything else we may want to get their input on as far as how we are doing at our job as educators of OHS professionals?

OHS professional questions

1. What do you see as the role of the generalist OHS practitioner?
2. What do you expect that a competent OHS professional should be able to do?
3. What is the basic knowledge a competent OHS professional should have e.g. science, management, behavioural, health based?
4. How important do you think knowledge learning is compared with experiential learning?
5. What are the skills and attributes a competent OHS professional should have?
6. Should the entry level requirement for an OHS professional be UG, PG, or vocational?
7. Are you happy with the way OHS practitioners are being taught at Australian universities? If not why?
8. What do you feel needs to have more emphasis in uni courses with regards to the main discipline areas usually included in OHS
 - a. Risk management/safety
 - b. Occupational Hygiene
 - c. Ergonomics
 - d. Others e.g.: law, OHS management. ??
 - e. Are they happy with the level of skills on entry into the workplace?
9. What do you think are the appropriate qualification and experience levels for think are the appropriate qualification and experience levels for OHS educators? Do OHS Educators need to be involved in research?
10. Is there anything else that you would like to add and as far as how we are doing at our job as educators of OHS professionals?

Appendix 4:

Survey questionnaires for OHS professionals, educators, regulators and graduates

OHS Professionals Survey on OHS Education in Australia

Thank you for participating in this survey. Your feedback is greatly appreciated. Please answer the questions as honestly as possible. If you do not wish to answer a question, just leave it blank.

To answer the questions, either click the grey check box next to the appropriate response or type your response in the grey comment area after the question.

1. What is your gender?
 Male
 Female

2. What is your age? _____ years

3. Please list all of your educational qualifications, including those not related to OHS. Where and when did you attain these qualifications?
Type response here - Please consider vocational, undergraduate and postgraduate qualifications:

4. What is your current OHS position? Please only indicate your position title, not your organisation name.

5. How many years have you been working in the OHS field? _____ years

6. What is the postcode of your place of employment? _____

7. A **generalist** OHS professional should have knowledge based in which of the following areas?
Please rank in order of importance (1 = most important).
_____ Science based
_____ Management based
_____ Behavioural based
_____ Health based
_____ Other – Please specify _____

8. What do you expect that a competent **generalist** OHS professional should be able to do in their OHS capacity? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

9. What are the skills and attributes a competent **generalist** OHS professional should have? *Select all that apply.*

- Computer skills
- Information retrieval
- Oral communication
- Problem solving
- Written communication
- Team work
- Knowledge of research methodology
- Knowledge of ethics and social issues
- Knowledge and understanding of OHS concepts, models and theories
- Other - Please specify _____

10. How important do you think knowledge learning is compared with experiential learning?

- Knowledge learning is definitely more important
- Knowledge learning is slightly more important
- Equally important
- Experiential learning is slightly more important
- Experiential learning learning is definitely more important

11. What OHS content areas should be taught at each level?

Select all that apply at each level.

CONTENT AREAS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS law	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accident investigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS auditing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

12. What are the skills and attributes that should be acquired at each level?

Select all that apply at each level.

SKILLS/ATTRIBUTES	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information retrieval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Written communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of research methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of ethics and social issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge and understanding of OHS concepts, models and theories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

13. What do you see as the role of RTO's (registered training organisations including TAFE) in OHS education?

Select all that apply.

- Provision of short courses in OHS for practitioners
- Provision of short courses in OHS for other specialty groups (non OHS)
- Provision of continuing professional development for OHS practitioners/professionals
- Basic training for OHS practitioners
- Alternate pathway for entry as an OHS professional
- Articulation to tertiary qualification
- Other – Please specify _____

14. Are you happy with the way OHS practitioners are being educated at Australian universities?

Please select one.

- Very happy
- Happy
- Neutral
- Unhappy
- Very unhappy

15. If you are unhappy or very unhappy with the way OHS practitioners are being educated, WHY?

Type response here:

16. What areas do you feel are covered well in university courses with regards to the main content areas usually included in OHS? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

17. What areas do you feel need to have more emphasis in university courses with regards to the main content areas usually included in OHS? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

18. In general, are you happy with the **generalist** OHS professional's skill level on entry into the workforce? *Please select one.*

- Yes
- No
- Unsure/Don't know

19. What should be the minimum educational qualification required for an entry level OHS professional? *Please select one.*
- Vocational
 - Undergraduate
 - Postgraduate
 - Undergraduate or postgraduate
 - Vocational or undergraduate or postgraduate
 - Other - Please specify _____
20. Do you think that some form of professional accreditation is necessary to be able to practice as an OHS professional? *Please select one.*
- Yes
 - No
 - Unsure/Don't know
21. What do you think is the appropriate educational qualification for university OHS educators? *Please select one.*
- Vocational
 - Undergraduate
 - Postgraduate
 - Research higher degree
 - Either undergraduate or postgraduate
 - Both undergraduate and postgraduate
 - As long as they have worked in the industry (for a minimum number of years), no qualification required
 - Other - Please specify _____
22. What do you think are the appropriate experience levels for university OHS educators? *Please select one.*
- OHS experience is not necessary
 - Less than 5 years OHS experience
 - 5 to 10 years OHS experience
 - > 10 years OHS experience
 - Other - Please specify _____
23. Do university OHS educators need to be involved in research? *Please select one.*
- Yes
 - No
 - Unsure/Don't know
24. Are there any other issues in OHS education that you would like to comment on?
Type comments here:

25. If you would like to receive a plain English copy of the results, please provide us with your contact email address below.

Enter email address here:

Thank you for participating in this survey. Once complete, please email to: k.joyner@cqu.edu.au

OHS Educators Survey on OHS Education in Australia

Thank you for participating in this survey. Your feedback is greatly appreciated. Please answer the questions as honestly as possible. If you do not wish to answer a question, just leave it blank.

To answer the questions, either click the grey check box next to the appropriate response or type your response in the grey comment area after the question.

1. What is your gender?
 Male
 Female
2. What is your age? _____ years
3. Please list all of your educational qualifications, including those not related to OHS. Where and when did you attain these qualifications?
Type response here - Please consider vocational, undergraduate and postgraduate qualifications:
4. What is your current OHS position? *Please only indicate your position title, not your organisation.*

5. How many years have you been working in the OHS field? _____ years
6. What is the postcode of your place of employment? _____
7. A **generalist** OHS professional should have knowledge based in which of the following areas?
Please rank in order of importance (1 = most important).
_____ Science based
_____ Management based
_____ Behavioural based
_____ Health based
_____ Other – Please specify _____

8. What do you expect that a competent **generalist** OHS professional should be able to do in their OHS capacity? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

9. What are the skills and attributes a competent **generalist** OHS professional should have? *Select all that apply.*

- Computer skills
- Information retrieval
- Oral communication
- Problem solving
- Written communication
- Team work
- Knowledge of research methodology
- Knowledge of ethics and social issues
- Knowledge and understanding of OHS concepts, models and theories
- Other - Please specify _____

10. How important do you think knowledge learning is compared with experiential learning? *Please select one.*

- Knowledge learning is definitely more important
- Knowledge learning is slightly more important
- Equally important
- Experiential learning is slightly more important
- Experiential learning is definitely more important

11. What OHS content areas should be taught at each level?

Select all that apply at each level.

CONTENT AREAS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS law	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accident investigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS auditing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>			

12. What are the skills and attributes that should be acquired at each level?

Select all that apply at each level.

SKILLS/ATTRIBUTES	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information retrieval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Written communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of research methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of ethics and social issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge and understanding of OHS concepts, models and theories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>			

13. What are the appropriate assessment models and methods at each level? Select all that apply at each level.

ASSESSMENT MODELS/METHODS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Essay style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Short answer style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multiple choice end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In class objective assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other written work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Class/online participation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skill/competency based assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>			

14. Select the current delivery/learning methods used to achieve student learning outcomes.

Select all that apply.

- Lectures
- Labs
- Tutorials
- Self-directed reading
- Independent conduct of research
- Problem based learning
- Seminar presentation/attendance
- Online/flexible learning
- Practicums
- Industry mentoring
- Other - Please specify _____

15. Which of the following influence your own teaching?

Select all that apply.

- Student evaluation
- Reflective practice
- Scholarly research in OHS learning and teaching
- Use of central learning and teaching units
- None
- Other - Please specify _____

16. What should be the minimum educational qualification required for an entry level OHS professional? *Please select one.*
- Vocational
 - Undergraduate
 - Postgraduate
 - Undergraduate or postgraduate
 - Vocational or undergraduate or postgraduate
 - Other - Please specify _____
17. Do you think that some form of professional accreditation is necessary to be able to practice as an OHS professional? *Please select one.*
- Yes
 - No
 - Unsure/Don't know
18. What do you think is the appropriate educational qualification for university OHS educators? *Please select one.*
- Vocational
 - Undergraduate
 - Postgraduate
 - Research higher degree
 - Either undergraduate or postgraduate
 - Both undergraduate and postgraduate
 - As long as they have worked in the industry (for a minimum number of years), no qualification required
 - Other - Please specify _____
19. What do you think are the appropriate experience levels for university OHS educators? *Please select one.*
- OHS experience is not necessary
 - Less than 5 years OHS experience
 - 5 to 10 years OHS experience
 - > 10 years OHS experience
 - Other - Please specify _____
20. Do university OHS educators need to be involved in research? *Please select one.*
- Yes
 - No
 - Unsure/Don't know

The next few questions ask you about an OHS 'community of practice'. A 'community of practice' is a voluntary network of people who share information, build on existing knowledge, develop expertise and solve problems for a common purpose, driven by the interest of the community involved (NHMRC, 2008).

21. Do you feel there is a 'community of practice' in OHS? *Please select one.*
- Yes
 - No
 - Unsure/Don't know

22. Are there any forums for discussion of OHS education that you are aware of? If yes, please provide examples of some of the forums.

Please select one.

- Yes – Please specify _____
 No
 Unsure/Don't know

23. Would you be willing to contribute to an OHS 'community of practice'?

Please select one.

- Yes
 No
 Unsure/Don't know

24. How do you think an OHS 'community of practice' can be created and maintained?

Type response here:

25. Does your department/school/faculty have a succession plan for OHS educators?

Please select one.

- Yes
 No
 Unsure/Don't know

26. What can be done to initiate or enhance a succession plan for OHS educators?

Type comments here:

27. Please indicate if the factors below influence staff **recruitment** in a positive, neutral or negative manner.

FACTORS	Positive influence	No influence	Negative influence
Other job opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salary/Total salary package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employment conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promotional opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities for further study	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

28. Please indicate if the factors below influence staff **retention** in a positive, neutral or negative manner.

FACTORS	Positive influence	No influence	Negative influence
Other job opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salary/Total salary package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employment conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promotional opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities for further study	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

29. Are there any other issues in OHS education that you would like to comment on?
Type comments here:

30. If you would like to receive a plain English copy of the results, please provide us with your contact email address below.
Enter email address here:

Thank you for participating in this survey. Once complete, please email to: k.joyner@cqu.edu.au

OHS Graduates and Alumni Survey on OHS Education in Australia

Thank you for participating in this survey. Your feedback is greatly appreciated. Please answer the questions as honestly as possible. If you do not wish to answer a question, just leave it blank.

To answer the questions, either click the grey check box next to the appropriate response or type your response in the grey comment area after the question.

1. What is your gender?
 Male
 Female
2. What is your age? _____ years
3. Please list all of your educational qualifications, including those not related to OHS. Where and when did you attain these qualifications?
Type response here - Please consider vocational, undergraduate and postgraduate qualifications:
4. What is your current OHS position? Please only indicate your position title, not your organisation.

5. How many years have you been working in the OHS field? _____ years
6. What is the postcode of your place of employment? _____
7. Why did you decide to study OHS?
Type response here:
8. How were you made aware of OHS as a career option?
Select all that apply.
 Career advisor
 Personal contact with OHS professional (e.g. friend, family, colleague)
 Advertising (e.g. television, radio, newspaper)
 Employment opportunities
 In response to a personal OHS incident
 Other - Please specify _____
9. A **generalist** OHS professional should have knowledge based in which of the following areas?
Please rank in order of importance (1 = most important).
_____ Science based
_____ Management based
_____ Behavioural based
_____ Health based
_____ Other – Please specify _____

10. What do you expect that a competent **generalist** OHS professional should be able to do in their OHS capacity? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

11. What are the skills and attributes a competent **generalist** OHS professional should have?

Select all that apply.

- Computer skills
- Information retrieval
- Oral communication
- Problem solving
- Written communication
- Team work
- Knowledge of research methodology
- Knowledge of ethics and social issues
- Knowledge and understanding of OHS concepts, models and theories
- Other - Please specify _____

12. How important do you think knowledge learning is compared with experiential learning?

- Knowledge learning is definitely more important
- Knowledge learning is slightly more important
- Equally important
- Experiential learning is slightly more important
- Experiential learning learning is definitely more important

13. What OHS content areas should be taught at each level?

Select all that apply at each level.

CONTENT AREAS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS law	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accident investigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS auditing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

14. What are the skills and attributes that should be acquired at each level?
Select all that apply at each level.

SKILLS/ATTRIBUTES	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information retrieval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Written communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of research methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of ethics and social issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge and understanding of OHS concepts, models and theories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

15. What are the appropriate assessment models and methods at each level?
Select all that apply at each level.

ASSESSMENT METHODS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Essay style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Short answer style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multiple choice end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In class objective assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other written work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Class/online participation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skill/competency based assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

16. Please rate the usefulness of each of the following teaching methods used to achieve student learning outcomes. If you didn't experience the teaching method, please select not applicable.

TEACHING METHOD	Very useful	Useful	Neutral	Not useful	Not useful at all	Not applicable
Lectures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Labs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tutorials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-directed reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Independent research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem based learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practicums	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industry mentoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seminar presentation/ attendance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online/flexible learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Were you happy with the way you were educated in OHS at your university?

Please select one.

- Very happy
- Happy
- Neutral
- Unhappy
- Very unhappy

18. If you were unhappy or very unhappy with the way you were educated, WHY?

Type response here:

19. What areas did you feel were covered well in university courses with regards to the main content areas usually included in OHS? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

20. What areas did you feel needed more emphasis in university courses with regards to the main content areas usually included in OHS? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

21. Please rate how useful you found the following content areas from your OHS program/degree in terms of your professional practice? If a certain content area was not covered in your university study, please select not applicable.

CONTENT AREAS	Very useful	Useful	Neutral	Not useful	Not useful at all	Not applicable
Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS law	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accident investigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS auditing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. How were you made aware of employment opportunities for OHS university graduates in your university OHS studies?

Type response here:

23. In general, were you happy with your OHS skill level on entry into the workforce?

Please select one.

- Very happy
- Happy
- Neutral
- Unhappy
- Very unhappy

24. What should be the minimum educational qualification for an entry level OHS professional?

Please select one.

- Vocational
- Undergraduate
- Postgraduate
- Undergraduate or postgraduate
- Vocational or undergraduate or postgraduate
- Other - Please specify _____

26. Do you think that some form of professional accreditation is necessary to be able to practice as an OHS professional? *Please select one.*

- Yes
- No
- Unsure/Don't know

27. What do you think is the appropriate educational qualification for university OHS educators?

Please select one.

- Vocational
- Undergraduate
- Postgraduate
- Research higher degree
- Either undergraduate or postgraduate
- Both undergraduate and postgraduate
- As long as they have worked in the industry (for a minimum number of years), no qualification required
- Other - Please specify _____

28. What do you think are the appropriate experience levels for university OHS educators?

Please select one.

- OHS experience is not necessary
- Less than 5 years OHS experience
- 5 to 10 years OHS experience
- > 10 years OHS experience
- Other - Please specify _____

29. Do university OHS educators need to be involved in research?

Please select one.

- Yes
- No
- Unsure/Don't know

30. Are there any other issues in OHS education that you would like to comment on?

Type comments here:

31. If you would like to receive a plain English copy of the results, please provide us with your contact email address below.

Enter email address here:

Thank you for participating in this survey. Once complete, please email to: k.joyner@cqu.edu.au

OHS RTO's Survey on OHS Education in Australia

Thank you for participating in this survey. Your feedback is greatly appreciated. Please answer the questions as honestly as possible. If you do not wish to answer a question, just leave it blank.

1. What is your gender?

Male

Female

2. What is your age? _____ years

3. Please list all of your educational qualifications, including those not related to OHS. Where and when did you attain these qualifications?

Type response here - Please consider vocational, undergraduate and postgraduate qualifications:

4. What is your current OHS position? Please only indicate your position title, not your organisation.

5. How many years have you been working in the OHS field? _____ years

6. What is the postcode of your place of employment? _____

7. What do you see as the role of RTO's in OHS education?

Select all that apply.

Provision of short courses in OHS for practitioners

Provision of short courses in OHS for other specialty groups (non OHS)

Provision of continuing professional development for OHS practitioners/professionals

Basic training for OHS practitioners

Alternate pathway for entry as an OHS professional

Articulation to tertiary qualification

Other – Please specify _____

8. A **generalist** OHS professional should have knowledge based in which of the following areas?

Please rank in order of importance (1 = most important).

_____ Science based

_____ Management based

_____ Behavioural based

_____ Health based

_____ Other – Please specify _____

9. What do you expect that a competent **generalist** OHS professional should be able to do in their OHS capacity? *Select all that apply.*

- Risk management
- Safety science
- Occupational hygiene
- Health promotion
- Ergonomics
- OHS law
- Occupational medicine
- OHS management systems
- Rehabilitation
- Accident investigation
- Wellness
- OHS auditing
- Occupational health
- Emergency management
- Organisational behaviour
- Other - Please specify _____

10. What are the skills and attributes a competent **generalist** OHS professional should have? *Select all that apply.*

- Computer skills
- Information retrieval
- Oral communication
- Problem solving
- Written communication
- Team work
- Knowledge of research methodology
- Knowledge of ethics and social issues
- Knowledge and understanding of OHS concepts, models and theories
- Other - Please specify _____

11. How important do you think knowledge learning is compared with experiential learning?

- Knowledge learning is definitely more important
- Knowledge learning is slightly more important
- Equally important
- Experiential learning is slightly more important
- Experiential learning is definitely more important

12. What should be the minimum educational qualification required for an entry level OHS professional?

Please select one.

- Vocational
- Undergraduate
- Postgraduate
- Undergraduate or postgraduate
- Vocational or undergraduate or postgraduate
- Other - Please specify _____

13. Do you think that some form of professional accreditation is necessary to be able to practice as an OHS professional?

- Yes
- No
- Unsure/Don't know

Questions 14 to 19 seek your opinion on various aspects of OHS education, often at the university level. If you feel that you do not have the required information/knowledge to answer the question, please skip the question or check the box indicating that you are not able to make an informed decision.

14. What OHS content areas should be taught at each level?

Select all that apply at each level.

CONTENT AREAS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health promotion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS law	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accident investigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wellness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OHS auditing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occupational health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

15. What are the skills and attributes that should be acquired at each level?
Select all that apply at each level.

SKILLS/ATTRIBUTES	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information retrieval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Written communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of research methodology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge of ethics and social issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge and understanding of OHS concepts, models and theories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

16. What are the appropriate assessment models and methods at each level?
Select all that apply at each level.

ASSESSMENT METHODS	RTO/TAFE	UNDERGRADUATE	POSTGRADUATE
Essay style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Short answer style end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multiple choice end of semester exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In class objective assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other written work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Class/online participation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skill/competency based assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify other here:</i>	_____	_____	_____

17. What do you think is the appropriate educational qualification for university OHS educators?

Please select one.

- Unable to make informed decision
- Vocational
- Undergraduate
- Postgraduate
- Research higher degree
- Either undergraduate or postgraduate
- Both undergraduate and postgraduate
- As long as they have worked in the industry (for a minimum number of years), no qualification required
- Other - Please specify _____

18. What do you think are the appropriate experience levels for university OHS educators?

Please select one.

- Unable to make informed decision
- OHS experience is not necessary
- Less than 5 years OHS experience
- 5 to 10 years OHS experience
- > 10 years OHS experience
- Other - Please specify _____

19. Do university OHS educators need to be involved in research?

Please select one.

- Unable to make informed decision
- Yes
- No
- Unsure/Don't know

20. Are there any other issues in OHS education that you would like to comment on?

Type comments here:

21. If you would like to receive a plain English copy of the results, please provide us with your contact email address below.

Enter email address here:

Thank you for participating in this survey. Once complete, please email to: k.joyner@cqu.edu.au

Appendix 5: OHS educator interview questions

Interview Questions

Name of interviewer:

Name of interviewee:

University of interviewee:

PART A: A matrix of service and core course/subjects needs to be constructed for the OHS content mapping exercise.

1. Can you please list the programs/degrees that your university currently offers in OHS?
2. Can you please list other programs/degrees that your university offers in which OHS may be taken as a major component?
3. Please complete the following matrix of courses/subjects/units within each individual OHS program/degree. NB: Programs include undergraduate degrees, associate degrees, graduate certificates, graduate diplomas, Masters by coursework.

(Add as many programs as appropriate)

N.B. Please indicate the number of courses or fractions of courses that cover the subject areas in the table below. Please indicate at the base of the table the total number of courses in each program.

	Program 1	Program 2	Program 3
Courses/Subjects/Units offered in the Program/Degree			
Accident Investigation			
Biology			
Chemistry			
Emergency management			
Environmental Studies			
Environmental Health			
Epidemiology			
Ergonomics/Human Factors			

Human Anatomy			
Human Physiology			
Human Resource Management			
Industrial Relations			
Management			
Mathematics			
Occupational Health			
Occupational Hygiene			
Organisational Behaviour			
OHS Management Systems			
OHS Law			
Physics			
Practicums			
Project			
Psychology			
Rehabilitation & Compensation			
Research Methods			
Risk Management			
Safety Science			
Statistics			
Training & Development			
Toxicology			
Others not listed above: please specify			
TOTAL NUMBER OF COURSES IN PROGRAM			

PART B: Questions on current unit profile, succession planning and current age profile of teaching staff.

4. What challenges has your department/unit faced in the learning and teaching of OHS in the last 3 to 5 years?
5. What are the strengths of the learning and teaching in your department/unit?
6. Do you expect any changes in learning and teaching in your department/unit in the near future? Why?
7. Have there been any changes in infrastructure and resources that will impact on the delivery of your programs? Why?
8. What is the current age profile of your OHS teaching staff?
9. Do you have a current succession plan for your OHS learning and teaching unit?
10. Do you think that current university promotion criteria and practices adequately reward the work done by OHS educators? Can you provide examples?
11. Do you consider you have reached a critical mass in your OHS teaching unit that will allow you to develop research as well as servicing your teaching requirements?
12. What type of support and incentives do you (your department/school or institution) provide for staff development in teaching, and for developing good teaching practices? Are these effective?
13. Following is a list of possible ways in which industry partners and government/jurisdictional can be involved in the teaching of OHS. Please select those being currently used by your department/unit.

List	Industry	Govt
Curriculum design		
Required industry experience/placement		
Financial support		
Assessment		
Field trips and site visits		
Advisory committee		
Guest lectures		
'in kind' support		
Case study material		
Career advice		
Scholarships		
Awards		
Industry project		
Student recruitment		
Other, please specify		

14. Do you have any issues with student recruitment and retention? Why?

PART C: Questions relating to curriculum design and modes of delivery.

15. How has your curriculum changed in the past 5 years in response to changing perceptions of employment opportunities? Please provide brief descriptions

16. Aside from traditional lectures, labs and tutorials, have you introduced new modes of teaching and learning (e.g. web based or e-learning, active learning labs, undergraduate research activities, field trips)? Please describe.

17. Is there anything else that you would like to say concerning OHS learning and teaching in your department?

18. Would you like to receive a plain English copy of the results? If yes, please provide us with a contact email address.

Appendix 6:

ALTC OHS Educators' Workshop discussion themes

Mapping disciplines into OHS

What drivers impact on the creation and nature of tertiary OHS education e.g. discipline base of faculty, university priorities, passion of OHS lead educator?

What are the challenges and benefits of our multi-, inter-, and transdisciplinary professional education and practice?

How can we fully exploit diverse models of delivery of OHS education to support our transdisciplinary professional practice?

- If unis can teach counselling via blended learning or e-learning why does the literature say this is not an effective approach?

Sustainability

What are the internal and external drivers and inhibitors influencing

- sustainability of the academy of OHS educators
- sustainability of OHS programs
- sustainability of the OHS profession

Why are we so old?

Where are the younger people?

Why are the educators the lowest profile components of the OHS profession?

What do you think are the strengths, challenges and gaps in current university level OHS education?

- depth of knowledge and practical industry experience of staff
- staff expertise
- lack of practical/industry experience (students)
- confusing educational pathways
 - inconsistencies in programs
 - tertiary vs VET
- lack of role definition: practitioners vs professionals

Community of practice

How do we develop, encourage and sustain:

- mutual engagement
- joint enterprise
- shared repertoire?

Appendix 7: Views expressed by interviewed OHS educators about OHS teaching and learning

Educator # Responses to the Question: What are the strengths of teaching and learning in your Department?

- 1 The unit is very small; strengths in sociological approach with a big picture view on issues such as globalization and the health and safety of workers.
Ability to teach OHS into related programs such as environmental health and human services.
Multidisciplinary approach.
- 2 Expertise in strategic areas, e.g. risk management.
Variety of content experts - Fire and explosion, Toxicology, Biomechanics, Environmental science.
- 3 Staff expertise.
Online aspects of postgraduate programs which is positive for students.
Multi-focused program and mostly workplace based.
- 4 Small staff (3) but each with different but complimentary focus, namely Safety, Health and Hygiene.
Inclusion of environment in OHS program.
Note that OHSD group not a unit of Department, rather 3 academics located in a School of Natural Science with a total of 65 staff.
- 5 Health-related course and staff background in health.
- 6 New cohort of lecturers, good spread of ages and good industry experience, good electronic delivery systems in place. New courses (programs) to be implemented in semester 2 – all re-written.
- 7 Flexibility in teaching and learning as all courses are available on line: Blackboard.
- 8 Depth of knowledge and practical industry experience of staff.
Ability to give undergraduate students a large component of industry experience (through extensive links with industry).
- 9 Competence and profile of staff; academic staff have theoretical underpinning plus current industry experience so bring a balanced and practical view to lectures.
Profile in Australian OHS education; program has been operating for 30 years.
Research informs teaching; all academic staff have PhDs and all are involved in research or supervise research students (current cohort of 4 PhD students).
Alumni: is very strong and interactive, provides good references for source of students, and organisations for applied research.
- 10 Block, residential and parallel delivery encourages community of practice, provides an alternative to regular face-to-face lectures or online mode. Social engagement and access to lecturers in extended on-campus session supports learning. Also supports application of adult learning principles as the alternation between the teaching block and return to the workplace encourages students to reflect on their own practice.
Student profile includes OHS-experienced students.

Educator #

Comments

11	<p>Multidisciplinary background of students (helpful in group work).</p> <p>Difference between undergraduate and postgraduate.</p> <p>Good library resources.</p> <p>Systems approach – based on good coverage of both biological and psychological human functional characteristics and capacities.</p> <p>Strong focus on diagnosis and problem solving, rather than learning rules and recipes; many assignments employ enquiry-based learning or problem-based learning approaches.</p> <p>High value placed development of both oral and written communication skills.</p> <p>Courses taught by people with high levels of expertise in specialist areas, including both underlying sciences (psychology, biology, statistics) and application areas.</p> <p>Focus on health and well being – OHS as promoting health in the broad sense as defined by the WHO, not just absence of injury/disease.</p> <p>Inclusion of international big picture issues.</p> <p>Considerable use of internet-based resources.</p>
12	<p>New department – relying on adjuncts/industry partners to bring experience.</p> <p>The new degree is aligned with the physiotherapy model.</p> <p>Staff enthusiasm.</p> <p>Staff diversity.</p>
13	<p>Integrated online delivery.</p> <p>High level of casual industry-based staff with expertise.</p> <p>Good use of technology.</p>
14	<p>Multidisciplinary.</p> <p>Research profile.</p> <p>Specialized infrastructure.</p> <p>Support from organization.</p>

Appendix 8: Views expressed by interviewed OHS educators about the challenges facing OHS education in Australia

Educator # Responses

- 1
Lack of students entering the undergraduate program
Difficulty in servicing the diverse and multidisciplinary needs of an OHS degree with dedicated OHS staff. Sessional staff do not contribute to development of a critical mass for research
Loss of the OHS strand in the Bachelor of Behavioural Science degree due to recruitment and restructuring issues
Difficulties at a multi-campus university with cross campus consistency
- 2
Perception of OHS in the University is poor
Ability of students to meet standards especially entrant into Grad. Cert. have little or no tertiary education background; the same comment applies for NES students from overseas.
Some masters students would prefer not to do research projects, i.e. all course work
- 3
Reduction in OHS academic staff numbers
Loss of undergraduate degree
Staffing for OHS and the visibility (lack) of OHS staff in the larger School of Health Sciences
Administrative changes in postgraduate delivery with centralization of delivery that has had positive academic benefits but negative financial benefits to the School of Health Science in which OHS resides
- 4
The university does not value the OHS program
Loss of undergraduate program due to difficulty in recruiting school leavers
Loss of named postgraduate degree in 2009 which was replaced by a strand in the Master of Science. Enrolment of 25 in 2008 under Master of Occupational Safety, Health and Environmental Management to 5 in 2009 under generic Master of Science
Poor marketing by university and degree nomenclature change identified as major challenges
- 5
Mismatch between demand for graduate placement
Students not attracted to OHS

Loss of undergraduate program

Aging work force

6 Phasing out of older staff, transition to proper online learning and teaching.

7 Workload

8 Reduced staffing; staff members have left and unit has not been allowed to rehire. It is also difficult to find suitable people.

Low entry score into BSC; getting numbers is important but what constitutes an appropriate cut-off? Want to push up the score and push harder regarding the content of the course and if students were more able this would be possible. The standards bar within the course has been raised over the past 5 years.

Unit has had an increase in funds for equipment, partly through retaining income from research and also through highlighting the requirement to set a professional standard, e.g. sufficiency, maintenance and calibration.

9 Internally: in the last 12 months a significant threat has arisen from a lack of understanding by the broader university of what the OHS unit is about, and what we do. OHS is somewhat invisible to the rest of the university as the students are on campus during the semester breaks and during semester time staff may be away from the campus on industry work.

Externally: the university was the among the first tertiary programs in Australia and has been operating for 30 years. There is increasing competition from other programs and those offering other modes, especially online teaching modes. However this competition has not significantly impacted on student numbers which have continued to increase at a modest rate.

10 Teaching 2 double degrees plus a major stream in a single degree (as one student group) with students of very different abilities (i.e. B Health Sci of Physio and OT)

Concurrent development of plans for return to postgraduate program.

How best to target prospective students (undergraduate and postgraduate)?

Re-development of undergraduate course work for a major stream, but with a wider range of other career options for those not proceeding to new masters (articulated with undergraduate stream).

Organisational challenges – resources, less time, much of the research is in own time

[Note there is little interest in Ergo, Health and Safety from the rest of the School (Human Biosciences)]

- 11 Unit has only been going for a year – time has been spent on developing an all encompassing curricula and finding resources to maintain the program.
Degree has not commenced yet.
Resources and funding are big issues as full income will not be achieved for 4 -5 years.
- 12 Business case for various possible scenarios in OHS teaching
On line delivery
Finding the right people for positions
- 13 Staffing resources
Going to external online delivery
More full-time students
- 14 Staff shortages
Downsizing