DISTANCE EDUCATION OF SAFETY AND HEALTH PROFESSIONALS AT A HIGHER EDUCATION INSTITUTION IN SOUTH AFRICA: CURRICULUM DEVELOPMENT

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Figures released by the Annual Report of the Compensation Fund depict a dim picture of the safety record of industries in South Africa. Billions are paid out on compensation and medical benefits. These figures have remained at these high levels over the past three years and highlight the dire need for professional safety practitioners in South Africa. To upgrade the professionalism of safety practitioners, the University of South Africa has embarked on developing a curriculum to offer a bachelor in commerce degree in safety management with the view of adding postgraduate courses up to doctoral level. Research was undertaken to ensure that the curriculum of the undergraduate course is in line with international courses (benchmarked against the American Society of Safety Engineers guidelines), requirements of industry professional associations (Delphi technique) and safety practitioners (questionnaire survey: 314 respondents). Although a strong preference existed for the national diploma in safety, the BCom (Safety management) was preferred over the BTech (Safety management). A definite need for postgraduate degrees surfaced. Clear preferences with regard to the role of the safety manager, the subject matter and the topics that should be included emerged. The course content for each of the three years of the BCom (Safety management) is discussed – the very first degree of its kind in South Africa.

Key phrases: Safety professionals, safety practitioners, occupational health and safety, curriculum development, training, education, BCom (Safety management)

INTRODUCTION

> *"As baby boomers reach retirement age and leave the profession, the demand for degreed safety professionals outstrips the supply, causing some educators and professional organizations to wonder where the profession is headed."* (Smith 2006:46).

The South African Department of Labour's Annual Report of the Compensation Fund depicts a rather dim picture of the safety record of industries in South Africa. The Compensation Fund administers the Compensation for Occupational Injuries and Diseases Act (COIDA) No 130 of 1993 as amended by COIDA No 61 of 1997. The main objective of the Act is to provide compensation for disablement caused by occupational injuries or diseases sustained or contracted by workers, or for death resulting from such injuries or diseases, and provide for matters connected therewith. For the year ended 31 March 2008, a total of 327 647 compensation benefits were paid, with the value amounting to R630 million, while a total of 815 045 medical benefits were paid, with the value amounting to R1.5 billion (DoL 2009:5, 17). These figures have remained at these high levels over the past three years and highlight the dire need for professional safety practitioners in South Africa.

The need for trained and educated professional safety and health practitioners is not only a South African phenomenon. The International Labour Office (ILO) revealed

that, despite global efforts to address occupational safety and health (OSH) concerns, an estimated 2 million work-related fatalities and 330 million work-related accidents still occur each year (ILO 2009:xi). Apart from the human suffering that results from work-related injuries and deaths, their economic costs at the enterprise, national and global levels are huge, taking into account compensation, lost working time, interruption of production, training and retraining, medical expenses and social assistance. The ILO advises that continued and renewed efforts are required to address this challenge and that a systems approach is appropriate to the management of OSH at all levels and the progressive establishment of a preventative safety and health culture based on the continuous provision of OSH information, training and education (ILO 2009:xii).

As far back as 1974 the World Health Organization (WHO) emphasised the need for occupational health and safety professionals, whatever the basic discipline, to be educated in a broader multidisciplinary context which recognised the importance of the socioeconomic and technological changes in the work environment (NOHSC 1994:1). At the October 2009 meeting of the WHO (2009:70) a workshop was convened for experts from collaborating centres and international partners to develop a proposal for scaling up international and national efforts on training and education in occupational health and safety. It was agreed to identify a set of competencies for this profession to address: activities, level of activity, good practice, definition of roles, and evaluation (WHO 2009:72). With regard to Occupational Safety and Health Disciplines, the following was minuted: “In Europe and North America, occupational health and safety disciplines are well defined with established practice and professional guidelines” (WHO 2009:72).

To achieve adequate levels of safety and health, workers with OSH functions should keep their skills up to date in relation to new prevention techniques, technological progress in general and new workplace hazards. The provision of OSH-related training at all levels, in other words the acquisition and maintenance of the knowledge and skills necessary to operate a national OSH system is of paramount importance (ILO 2009:164). Manuele (1993:45) postulated that it is only academic knowledge and skills acquired through stringent academic training that would prepare a person to enter the professional practice of safety.

COMPLEXITY OF THE JOB OF HEALTH AND SAFETY PROFESSIONALS

The complexity and diversity of the profession of safety and health practitioners can only be appreciated from a study of the definitions of the relevant terminology. “OSH is generally defined as the science of anticipation, recognition, evaluation and control

of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (ILO 2009:2). The safety and health professional is an individual "whose profession (job) is to be concerned with safety and health measures in the workforce" (Goetsch 2005:670). The job of safety an health professionals has become more complex than ever before owing to advances in technology, new legislation, the potential for costly litigation and a proliferation of standards (Goetsch 2005:628). These facts support the argument for the advanced training of health and safety professionals. Goetsch (2005:628) suggests that the training should consist of formal education prior to entering the profession and that it should then be supplemented by in-service training on a lifelong basis. The American Society of Safety Engineers (ASSE), which is the largest and leading professional association of safety practitioners in the world and the Board of Certified Professionals (BCSP), responsible for the registration of safety practitioners in the USA, proclaimed that "As we begin the twenty-first century, the safety profession requires highly educated, competent and motivated practitioners. … To meet future challenges, safety professionals need a strong academic background." (ASSE & BCSP 2007:vii).

Some American safety educators and professionals are concerned that safety education programs are being eclipsed by industrial hygiene, ergonomics and occupational health programs at universities (Smith 2006:46-47) and that doctoral degrees (PhDs) in safety are not offered. Out of all the universities in the United States, only one – West Virginia University – offers a doctorate in occupational safety and health and graduates four students a year. If so few graduating each year how will universities fill slots for professors of safety-related courses of study (Smith 2006:47)?

The need for professional safety practitioners is further driven by the fact that regulation through the ISO 9000 and the Occupational Health and Safety Amendment Act 181 of 1993 (OHSA) has become stricter and higher demands are placed on the skills of the safety practitioner. The OHSA (1993:11) stipulates that any organisation with 20 or more employees has to appoint a health and safety representative. The Mine Health and Safety Amendment Act 74 of 2008 (MHSA 2008:10) "requires all mines or groups of mines to prepare and implement a health and safety management system for mines". The Exxaro resources mining group, for example, is looking for a 30 percent improvement in safety (Sheqafrica.com 2009:1). The Presidential Safety Audit by the Minister of Minerals and Energy was conducted at 355 mines across five mining sectors – gold, platinum, coal, diamonds and smaller mining activities – and focused on the health and safety of mines in South Africa. It

highlighted safety shortcomings and leading practices in the mining industry and the need to accelerate safety improvement in the sector (Mining Africa Yearbook 2009:1)

The problem is that currently in South Africa a need exists for larger numbers of health and safety practitioners/officers with professional qualifications.

TRAINING OF HEALTH AND SAFETY PROFESSIONALS IN SOUTH AFRICA

In the early 1980s, training in safety management in South Africa (SA) was initialised by the National Occupational Safety Association (NOSA) owing to the need to provide safety officers with some theoretical background as a basis for operation. The former Technikon of SA (TSA), a distance education institute complied by offering the National Diploma in Safety Management (NDSM) on a distance education basis, followed by a Bachelor in Technologiae in Safety Management (BTech) (BTSM), on a post-graduate level. These two options are the only 'academic' training offered in SA with the BTech, being the highest qualification in Safety Management. Since 2004, when the government's higher education policy forced a merger between TSA and the University of SA (Unisa), a distance education institute, the latter offers the National Diploma and the BTech in safety management. The demand for these qualifications has increased substantially over recent years. From 2001 to 2008 the student enrolment for the National Diploma in Safety Management escalated from 561 to 3 842, while the student enrolment for the BTech (Safety Management) increased from 73 to 178. From these figures it follows that the number of people preparing themselves for careers in the safety profession through higher education programmes is increasing. Currently, no post graduate training for such professionals exists beyond the BTech (Safety Management). These qualifications are not adequately catering for the need for health and safety professionals. In order to provide industry with academically qualified professional safety practitioners, Unisa engaged in developing a new curriculum for an academic Bachelor of Commerce degree in safety management (BCom (Safety Management)) available through distance education. After completing the BCom (Safety Management), students will be able to articulate to an honours degree, followed by a master's degree and finally a doctorate degree. Only one other higher education institution (HEI) in South Africa, the Vaal University of Technology, offers training in safety management but they only offer a BTech (Safety Management).

BENCHMARKING CURRICULUM DEVELOPMENT

Owing to the fact that the quality of safety practice in South Africa is in many respects not on par with the world's best practices, it became necessary to benchmark against the USA, Britain, Canada, Germany, Australia, Japan and Hon Kong. Although the safety education in these countries exhibited a fairly similar emphasis on educational standards and curriculum content, it was evident that the curriculum contents, standards and emphasis of the ASSE and BCSP set the pace in safety education and training. Therefore their standards and guidelines were taken as a benchmark.

The ASSE/BCSP points out that the primary focus for the safety profession is prevention of harm to people, property and the environment. Therefore, safety professionals studying safety science apply principles drawn from such disciplines as engineering, education, psychology, physiology, biomechanics, medicine, enforcement, hygiene, health, chemistry, biology, physics, ergonomics, environmental sciences, business management, economics and even sociology (ASSE & BCSP 2007:3). Safety science enables people to identify, evaluate, and control or prevent hazards, as well as to provide management methods for setting policy and securing funds to operate safety activities in a company.

According to the ASSE/BCSP (2007:5-6) the precise roles and responsibilities of safety professionals depend on the nature of the industry and the company where they work, but most of them do at least several of the following:

- *Hazard recognition*: identifying conditions or actions that may cause injury, illness or property damage.
- *Inspections/audits*: assessing safety and health risks associated with equipment, materials, processes, facilities or abilities.
- *Fire protection*: reducing fire hazards by inspection, layout of facilities and processes, and design of fire detection and suppression systems.
- *Regulatory compliance*: ensuring that mandatory safety and health standards are satisfied.
- *Health hazard control*: controlling hazards such as noise, chemical exposures, radiation, or biological hazards that can create harm.
- *Ergonomics*: improving the workplace based on an understanding of human physiological and psychological characteristics, abilities and limitations.
- *Hazardous materials management*: ensuring that dangerous chemicals and other products are procured, stored, and disposed of in ways that prevent fires, exposure to or harm from these substances.

- *Environmental protection*: controlling hazards that can lead to undesirable releases of harmful materials into the air, water or soil.
- *Training*: providing employees and managers with the knowledge and skills necessary to recognize hazards and perform their jobs safely and effectively.
- *Accident and incident investigations*: determining the facts related to an accident or incident based on witness interviews, site inspections and collection of other evidence.
- *Advising management*: helping managers establish safety objectives, plan programmes to achieve those objectives and integrate safety into the culture of an organisation.
- *Record keeping*: maintaining safety and health information to meet government requirements, as well as to provide data for problem solving and decision making.
- *Evaluating*: judging the effectiveness of existing safety and health related programs and activities.
- *Emergency response*: organizing, training and coordinating skilled employees with regard to auditory and visual communications pertaining to emergencies such as fires, accidents or other disasters.
- *Managing safety programmes*: planning, organizing, budgeting, and tracking completion and effectiveness of activities intended to achieve safety objectives in an organisation or to implement administrative or technical controls that will eliminate or reduce hazards.
- *Product safety:* assessing the probability that exposure to a product during any stage of its lifecycle will lead to an unacceptable impact on human health or the environment and determining the appropriate auditory and visual hazard warnings.
- *Security*: identifying and implementing design features and procedures to protect facilities and businesses from threats that introduce hazards.

SOUTH AFRICAN COMPETENCIES OF SAFETY PRACTITIONERS

Timmermans (2005:7-10) established an assessment centre for safety practitioners in SA and identified competencies that serve as assessment criteria within the context of industrial practice. A group of safety practitioners, which included senior safety practitioners and safety managers, selected a set of competencies that safety practitioners must master in order to be professionally successful using an inductive Delphi approach. They were also exposed to the psychometric test, known as the Occupational Personality Questionnaire (OPQ). The group identified a set of

dispositions as essential competencies that serve as prerequisites for the successful practice of safety. Both the OPQ and the list of competencies were tested by means of two different deductive Delphi exercises with safety practitioners before they were practically administered and utilised to assess safety practitioners. The following essential competencies were identified: information search, analytical and systemic thinking, conceptual thinking, problem solving and decision making, cross-boundary liaison, organisational awareness, excellence orientation, client orientation, drive and implementation, planning, organising and control, influencing, interpersonal listening, learning, communication and presentation, management and sharing of safety, health and environmental (SHE) expertise, continual learning and development.

On completion of the review and synthesis of the existing knowledge on the curriculums for educating health and safety professionals and competencies that they should possess, it was possible to start empirical research.

The question that needed answering was: What critical content should be included in the curriculum to ensure adequate and appropriate skills development for professional recognition of health and safety professionals, taking into consideration that modern safety practitioners operate in work environments that are undergoing constant technological, legislative, social, economic and cultural changes?

METHODOLOGY

To design an appropriate curriculum in safety management within the South African context, different research approaches were adopted. The study started off as exploratory research followed by descriptive research. Hussey and Hussey (1997:13) confirm that this is possible. The first approach was a qualitative research approach using the Delphi technique, “a widely used and accepted method for gathering data from respondents within their domain of expertise” (Hsu & Sanford 2007:1). Such a group communication process aims to achieve a convergence of opinions on a specific real-world issue – in this instance, the training of safety professionals – for a specific purpose, in this case, that of curriculum development. This was followed by a quantitative approach, involving a survey using a questionnaire. In line with Cooper and Schindler’s (2001:12) definition of descriptive research, the study “tries to discover answers to the questions *who, what, when,* and *where*”. These authors point out that descriptive investigation has a broad appeal to the administrator and policy analyst for planning, monitoring and evaluating.

Exploratory research - the Delphi technique

Firstly, members of the South African Board of Registration for Occupational Hygiene, Safety and Associated Professionals (OHSAP) (responsible for the registration of qualified safety practitioners in SA), as well as members of the Institute of Safety Managers (the professional association of safety practitioners in SA) were consulted in determining the type and level of academic training. Secondly, Unisa lecturers in safety management held a workshop with a team of leading safety practitioners in SA to determine the required level of professional academic training of safety practitioners in SA with the view to acquire congruency with international standards of professional practice. Thirdly, a meeting was convened with a group of safety and risk managers from leading industries in SA, as well as prominent safety practitioners from the formal and non-formal sectors in SA. Participants in this meeting explicitly motivated the need for academic professional training for safety practitioners in SA.

Descriptive research

From the input of the above mentioned consultations and the international benchmarking, a questionnaire was prepared to tap into the valuable body of knowledge held by current and former students in safety management (most of them were practicing safety practitioners) on possible topics and specific fields of study to be included in a BCom Safety Management. The questionnaire consisted of 10 questions, each with a range of predetermined answers. A convenience sampling technique was used and the sample consisted of 1 192 current and former Unisa students in Safety Management. The questionnaire was e-mailed to all these students and 321 (26.9%) completed questionnaires were returned.

RESULTS OF THE SURVEY

Designations of respondents

The majority of the respondents (68%) held a position with the word safety (43%) or SHE/SHEQ/SHERQ (25%) in the designation, which, from a practical safety management perspective, qualifies them to provide input on the content of a safety management curriculum. What is of further interest is the range of other designations (27% of the respondents) who have also enrolled in safety management, such as administrative assistant, airport fire fighter, assistant engineer, branch manager, chief analyst, COID administrator, commander dog-unit SA Police, consultant, contractor superintendent, engineering manager, environmental health practitioner, environmental manager, environmental technologist, IMS coordinator, inspector of mines, IT

supporter, labour inspector, maintenance clerk, millwright/artisan, occupational health nurse, OHSA administrator, operational manager, operations controller, operator, process controller, production shift supervisor, radiation protection officer, risk auditor, solids control engineer, supervisor, surveillance analyst, systems consultant and training officer. This supports the earlier statement that any employee accountable for OHS needs training. About 5 percent of the respondents did not indicate a designation.

Line or staff functionary

Most of the respondents (76.8%) are currently performing staff functions while 17.8 percent are currently performing line functions. Correspondingly, most of them (78.7%) are of the opinion that staff functions best apply to the functions a safety practitioner/officer should be performing, while 17.2 percent suggest that line functions best apply. From these results, it seems that a bias exists with regard to the preferred function, whether staff or line function, for a safety practitioner/officer.

Responsibilities suiting the functions of a safety practitioner/officer

Respondents were asked to indicate whether six preselected responsibilities suite the functions of a safety practitioner/officer, by responding either “Yes” or “No” next to each given responsibility, and they had the option to add other responsibilities. The six responsibilities were taken from the ASSE and BCSP Career guide to the safety profession (2000:3-4).

All six responsibilities were identified by an overwhelming majority as being suitable as a function of a safety practitioner/officer, but the responsibility to anticipate, identify, analyse and evaluate hazardous conditions came up tops (93%). It was followed in second position by the responsibility to analyse incidents to identify efficiencies in SHE-systems (90.8%), and in third position by the responsibility to analyse incidents to identify efficiencies in SHE-systems (89.8%).as a suitable responsibility. Fourth position was awarded to the responsibility to measure, audit and evaluate effectiveness of controls (89.4%), in fifth place, by the responsibility to advise on the implementation and administration of control programs (87.3%) and in last position, but still with a high score of 86.6 percent, the responsibility to provide advice on how to maintain the process of continual improvement. The results are shown in Table 1.

Table 1: Responsibilities that suite the functions of a safety practitioner

Responsibility	Number of respondents	Percentage of respondents
Anticipate, identify, analyse and evaluate hazardous conditions	292	93.0
Analyse incidents to identify deficiencies in SHE-systems	285	90.8
Advise in developing of control designs, methods, procedures and programmes	282	89.8
Measure, audit and evaluate effectiveness of controls	281	89.4
Advise in implementation and administration of control programs	274	87.3
Advise on maintaining the process of continual improvement	272	86.6

Roles of a safety practitioner/officer

Respondents had to indicate on a preselected list of roles which of them apply to a safety practitioner/officer by answering either "Yes" or "No" next to each of the 10 given roles. The option existed to add other roles. The three roles that emerged as the most important roles of the safety practitioner/officer were advisor (93%), communicator (91.1%) and facilitator (90.4%). These were followed by the roles of continuous improvement agent (89.4%), trainer (86.6%), coach (82.8%), relationship builder (78.3%), mentor (78%), change agent (72.9%) and lastly, collaborator (67.5%). No additional roles were added by the respondents. The results are reflected in Table 2.

Table 2: Roles that apply to safety practitioners/officers

Role	Number of respondents	Percentage of respondents
Advisor	292	93.0
Communicator	286	91.1
Facilitator	284	90.4
Continuous improvement agent	281	89.4
Trainer	272	86.6
Coach	260	82.8
Relationship builder	246	78.3
Mentor	245	78.0
Change Agent	229	72.9
Collaborator	212	67.5

Suitable qualifications for the training of safety practitioners/officer

Participants in the study had to indicate which of the current and the proposed qualifications are suitable for the training of safety practitioners/officers. As can be expected, 76.4 percent of the respondents indicated that the National Diploma in Safety Management, which is currently in place, is suitable to train safety practitioners/officers. From the percentages, it seems that the respondents find the BCom (Safety Management) degree (64%) more suitable than the BTech (Safety

Management) degree (56.7%) for the training of safety practitioners/officers. This veers positively for instituting the BCom (Safety Management). With regard to the postgraduate studies, namely the honours, master's and doctoral degrees in safety management, the respondents indicated sufficient support for these degrees (33%, 42% and 36% respectively) to consider their institutionalisation. At postgraduate levels, the number of interested students is usually much lower and so these percentages are acceptable.

Subjects to be included in a proposed BCom (Safety Management) degree

Respondents had to rate a predetermined list of subjects in terms of their importance of inclusion in a proposed B Com (Safety Management) degree on a four-point Likert scale. The options ranged from irrelevant to very important, with no middle option available. The Likert scale is a variation of the summated rating scale and consists of statements that indicate either a favourable or unfavourable attitude to the research subject (Cooper & Schindler 2001:234). Four-point Likert scaling being a bipolar scaling method, measures either a positive or negative response to a statement. For each of the subjects, a concise description of the typical content for that subject was given in the questionnaire.

From table 3, it follows that the subjects can be grouped into four clusters with regard to importance. It is obvious that the most important cluster of subjects consist of safety management, SHE legislation and safety risk management, all three considered "very important" (90.1%, 89.8% and 88.9% respectively) for inclusion in a BCom (Safety management) degree. The second cluster of subjects has a high combined important/very important ranking but with "very important" ranked higher and consists of the following subjects: environmental management, occupational hygiene, quality management, ergonomics and industrial and organisational psychology. The third cluster of subjects has a fairly high combined important/very important ranking but in each case the "important" percentages are higher. This cluster is made up of the following subjects: financial risk management, organisational development, management of production and operations and business management. The cluster of subjects that is considered "not so important" consists of national, corporate and enterprise economics and accountancy. From the answers to this question, clear preferences have emerged.

Table 3: Possible subjects for inclusion in a proposed BCom (Safety Management) degree

Subjects	No response %	Irrelevant %	Not so important %	Important %	Very important %
Safety management	5,1	0,3	0,3	4,1	90,1
SHE legislation	5,1	0,6	0,3	4,1	89,8
Safety risk management	6.1	0,3	0,3	4,5	88,9
Environmental management	5,7	0,3	1,6	24,8	67,5
Occupational hygiene	6,4	0,3	2,5	24,2	66,6
Quality management	5,4	0,3	1,3	26,8	66,2
Ergonomics	6,4	0,3	3,8	27,4	62,1
Industrial and organisational psychology	5,7	0,6	4,1	34,1	55,4
Financial risk management	5,4	1,6	14,6	41,4	36,9
Organisational development	5,4	1,3	11,5	49,0	32,8
Management of production and operations	5,7	2,9	13,7	47,1	30,6
Business management	5,7	1,6	10,5	55,1	27,1
National, corporate and enterprise economics	7,0	11,1	38,5	33,8	9,6
Accountancy	5,7	15,3	40,4	29,0	9,6

Topics in BCom (Safety Management)

Respondents had to indicate on a predetermined list of topics which ones they think should be included in the curriculum for training safety practitioners/officers in order to achieve a first degree (eg BCom). Respondents had the option of adding additional topics.

All of the listed topics where chosen by the overwhelming majority of respondents as topics that should be included in a first degree:

- Incident analysis and analysis techniques (92.0%).
- Hazard analysis, risk assessment and evaluation (90.4%).
- Safety systems (89.8%).
- Developing SHE culture (89.8%).
- Emergency preparedness (88.5%).
- Task process safety (86.6%).
- Behaviour based safety (86.6%).
- Auditing (86.6%).
- Safety training (85.4%).

- Handing hazardous substances (85.0%).
- Service provider (contractor) management (84.7%).
- Report writing (84.1%).
- Philosophy of safety management (84.1%).
- Fire safety (83.1%).
- Task analysis (83.1%).
- Safety engineering (82.5%).
- System safety (80.6%).
- History of safety management (62.1%).

Format of the degree - internship

The majority of the respondents (76.4%: 240 out of 314) said that a student should perform a mandatory internship. Out of these 240 respondents, most of them (77%) indicated that the duration of the internship should be three months, while 10 percent of these respondents preferred a duration of two months and 12.5 percent of these respondents said that the internship should last only one month.

DISCUSSIONS

The participants in the study had relevant experience in the field of safety management to make a meaningful contribution to the selection of course material for a BCom (Safety Management) degree as they jobs were predominantly related to that of safety practitioners. Although it seems from the findings that the BTech (Safety management) degree could be replaced with a BCom (Safety Management), the need for a Diploma in Safety Management is extremely high and this offering should remain. However, serious consideration should be given to enable students who have completed their Diploma in Safety Management to articulate to a BCom (Safety management) degree. The findings confirm that a need for even higher degrees, such as an honours, master's and doctorate degrees

The type of function that respondents are currently performing (line or staff function) is also the function that they feel best applies to a safety practitioner. The overwhelming majority of respondents are currently involved in staff functions where they provide assistance and advice for line function personnel with regard to safety.

From the high agreement on responsibilities of the functions of a safety practitioner, it is possible to define the exit level outcomes (a requirement of the South African Quality Authority (SAQA)) of the BCom (Safety management) degree. On completion of the degree, the learners should be able to:

- anticipate, identify, analyse and evaluate hazardous conditions;
- analyse incidents to identify deficiencies in the SHE-systems;
- provide guidance for the development of control designs, methods, procedures and programmes;
- measure, audit and evaluate the effectiveness of controls;
- counsel on the implementation and administration of control programs; and
- advise on maintaining the process of continual improvement.

In developing the curriculum for the BCom (Safety Management) the roles of safety practitioners/professionals, the suitable subject matter and the topics that have been identified in the survey, as well as the guidelines of the ASSE and BCSP should all be considered. Furthermore, a curriculum should take into consideration the requirements of the Council for Higher Education (CHE) and the National Qualification Framework (NQF) prescriptions (DoE 2007). Taken cognisance of all this information, a BCom (Safety Management) curriculum has been structured for implementation in 2012 as follows (30 modules for a total of 360 credits):

- First-year modules – NQF level 5: business management; economics; accounting concepts, principles and procedures; psychological process in work context; personality in work context; introduction to safety management; safety management in industry.
- Second-year modules – NQF level 6: business management; economics; accounting reporting; general management; production and operations management; organisational psychology; enterprise risk management; safety management precautionary measures; safety risk assessment; occupational health theory; occupational health and safety law; ergonomics.
- Third-year modules – NQF level 7: strategic management; organisational development and change; incident assessment and analysis, managing organisational safety culture; systems in safety management; quality management systems; safety management auditing; safety management in world context; occupational health and safety law; plus one subject elected from an A list of subjects.

In spite of the fact that survey respondents showed an aversion to accounting and economics being included in a BCom (Safety management), these subjects and business management, general management and strategic management are necessary requirements for safety professionals. A survey of certified safety professionals (CSPs), Ferguson (1994:79-81 in Adams 2003:18-21) found that baccalaureate course work in risk management and in areas associated with business, such as total quality management and the financial aspects of safety was needed. Blair (1997:127-131 in Adams 2003:18-21) surveyed a different group of CSPs and identified that their most challenging problem is the lack of commitment and support of upper management. He recommended that knowledge of business, accounting and marketing be included in safety management programmes. Adams (2003:18) recommended that "to promote the cost-effective use of organisational resources, SHE professional must understand the basics of business management and related disciplines such as accounting and finance. They must be able to communicate from the unique perspective of top management".

The inclusion of subjects such as psychological process in work context; personality in work context, organisational psychology and organisational development and change is in line with the role of the safety professional as advisor, communicator, facilitator, trainer/coach, relationship builder, mentor and change agent. This is supported by Swuste and Arnoldy (2003:15-27) who pointed out that the role of a OHSE professional is such that it requires "attention to organisational theory, company structure and function, budgeting, planning, etc. The safety adviser/manager is becoming an important factor in introducing the concept of a learning organisation within a company or organisation." Thus, to be effective, the safety professional has to be familiar with the human behavioural requirements of a safety, health and environment policy and systems, and the drivers and mechanisms of individuals and groups in order to make optimal use of training, communication methods and personal skills as a major source of influence. The authors consequently introduced a master's course-module on management of change at the Delft University of Technology.

The overwhelming popularity of the National Diploma in Safety Management among the respondents, as well as the increasing large numbers of students who enrol for this diploma at Unisa, cannot be ignored as it indicates a tremendous need for training at this level. Therefore, this qualification should not be summarily dismissed. It could be structured so that students, who have completed the NDSM, could articulate to the BCom (Safety Management) on completion of additional subjects, such as the dreaded accounting and economics. It may be necessary to find ways to encourage more individuals to achieve the highest level of safety education.

Research needs to be conducted to determine how to encourage students to enrol for a MCom (Safety management) as well as to formulate PhD programs that challenge individuals to meet future needs.

Results indicated that candidates who enrol for the proposed BCom (Safety Management) degree should also perform a mandatory internship, preferably for three months. Internship has not yet been incorporated in the proposed BCom (Safety Management) curriculum and this would have to receive serious consideration. Fender and Watson (2005:36) identified three stakeholders that can benefit from OHS internships, namely the students, employers and universities, provided that the clear goals are set for the internship and that all stakeholders comply with the goals. Although the BCom (Safety management) does not yet include internships, the curriculum will be designed to incorporate work integrate learning (WIL) which involves "periods of required work that integrate with classroom study" (DoE 2007:9) to contribute to training of a professional standard.

Qualified students could operate as safety practitioners, safety managers or safety consultants in any industry and in any company employing more than 20 employees.

IMPLICATIONS

Improvement in safety in the work environment

A recent study confirmed the need for higher educated safety practitioners to reduce work-related injuries and deaths. In a study involving Ghanaian industrial workers (sample size of 320), Gyekye and Salminen (2009:20-28) examined the relationship between educational attainment and (i) safety perception, (ii) job satisfaction, (iii) compliance with safety management policies, and (iv) accident frequency. Participants were categorized into four educational groups based on their responses: basic education (50%); secondary education (30%); vocational/professional education (17%) and university education (3%). Workplace safety perception was assessed with Hayes, Perander, Smecko and Trask (1998:145-161) 50-item Work Safety Scale (WSS): a scale that effectively captures the dimensions identified by safety experts to influence perceptions of workplace safety. Multivariate analysis (MANOVA) was used to test for differences of statistical significance. Posterior comparison with *t*-test consistently revealed significant differences between the two higher-educated cohorts and their lower-educated counterparts. The results indicated a positive association between education and safety perception. Higher-educated workers recorded the best perceptions on safety, indicated the highest level of job

satisfaction, were the most compliant with safety procedures and recorded the lowest accident involvement rate.

Development of post-graduate degrees

With the institutionalising of BCom (Safety management) at a higher education institution, the safety management professional would have the option of vertical progression to higher level degrees. Thus, the offering of and research into curriculum development for a BCom Honours in safety management (NQF level 8) will have to be conducted. This degree serves to consolidate and deepen the student's expertise in the discipline of safety management, and to develop research capacity in the methodology and techniques of this discipline (DoE 2007:25). Thereafter attention should focus on designing a MCom in safety management (NQF level 9) and a DCom in Safety Management (NQF level 10). The master's degree may be earned in either of two ways: (1) by completing a single advanced research project, culminating in the production and acceptance of a thesis or dissertation, or (2) by successfully completing a course work programme requiring a high level of theoretical engagement and intellectual independence and a research project, culminating in the acceptance of a dissertation (DoE 2007:27). The doctoral degree may only be earned through the completion of a research-based thesis (DoE 2007:29).

Professional status and recognition

The offering of a professional degree in safety management at a higher education institute would contribute substantially to recognising the professional status of safety managers. Safety practitioners need to be recognised and treated as professional people, and respected for the qualitative safety advice they deliver as professional people, to the same degree as the occupational health nurse, doctor, human resource person, hygienist, ergonomist, environmental management person and the engineer are respected.

In conclusion, for the first time ever in South Africa, and it is available for the rest of Africa, a distance education training of safety professionals will focus on achieving professional competence to perform safety management functions and roles through acquiring applicable knowledge and mastering applicable skills. Appropriately qualified safety and health practitioners will be able to contributing to curbing the high level of occupational injuries and deaths.

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