

# Concept development for facilitating the health and safety efficacy of South African mine workers

by

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Submitted in partial fulfilment of the requirement for the degree of  
Doctor of Philosophy in the Faculty of Education  
University of Pretoria

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31 August 2011

## ACKNOWLEDGEMENT

Many people have helped, supported and inspired me in my work and studies over the years, too many to mention here. However, I wish to formally thank the following people for their special support and assistance in this undertaking: Professor Jill Murray, Edward French, Professor John Aitchison, Patrick Baloyi, Zodwa Ndlovu, Dr. Vaughn John, Steven le Roux, Jeannie Beukes and especially my supervisor Professor Mokubung Nkomo.

## ABSTRACT

The aim of this research is to inform conceptual approaches to health and safety (H&S) training for mineworkers in South Africa. The study focuses specifically on those mineworkers who have the least formal education or training, termed elementary workers (unskilled) and machinery operators and drivers (semi-skilled). It is an integrative literature review of sources drawn from mine health and safety in South Africa; self-efficacy; adult education and training (AET); education and training in mining; and relevant health promotion studies. The sources selected refer to work in the Southern African mine H&S context, or comparable situations. Compelling ideas and formulations for training are suggested in the literature of the different disciplines reviewed.

A core concept considered is self-efficacy and the concept has substantial support in the literature. Both the term and concept of ‘self-efficacy’ have been used in South African and mining studies, but often without proper consideration of the sources of self-efficacy and its task- and context-specificity.

The review reveals a lack of evidence of effective advocacy and training around generic mining occupational hazards, such as lung disease. H&S training is most evidently linked to operator training, which is aligned with unit-standards. However, substantial numbers of mineworkers lack adequate formal education for such training programmes, or the informal skills to be included via recognition of prior learning (RPL) processes. The proposed role of H&S representatives appears demanding, but the associated skills training outlined in public unit standards, lacks essential elements.

The findings identify key considerations for an underpinning approach to H&S training for elementary mineworkers. These are: new learning required; risk perception and management; existing and associated logics; team ethos; maintaining new learning and practice; and a dialogic aspect to programmes. Additional findings suggest that the convergent effects of different policies result in the training of the least educated mineworkers being marginalised. The study concludes with six propositions that relate to the research and development of H&S training for mineworkers, public evidence of training, policy effects and the predicament of mineworkers who lack formal education.

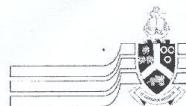
## KEY WORDS

Adult education  
 Adult basic education and training (ABET)  
 Adult learner  
 Health and safety (H&S)  
 Mineworker  
 Mining  
 Policy  
 Self-efficacy  
 South Africa  
 Training

## ACRONYMS AND ABBREVIATIONS

ABET	Adult basic education and training
AET	Adult education and training
ANC	African National Congress
ASM	Artisanal and small mines
BEE	Black economic empowerment
BBS	Behaviour-based safety
CAL	Computer-aided learning
CEO	Chief executive officer
COM	Chamber of Mines
COSATU	Congress of South African Trade Unions
DME	Department of Minerals and Energy
DMR	Department of Minerals Resources
DOE	Department of Education
DHET	Department of Higher Education and Training
GEAR	Growth, Employment and Redistribution Strategy
GDP	Gross Domestic Product (GDP)
H&S	Health and safety
HEARD	Health Economics and HIV Aids Research Division
HIRA	Hazard identification and risk assessment
HIV	Human immunodeficiency virus
HRD	Human resource development
HSRC	Human Sciences Research Council
MHSA	Mine Health and Safety Act
MHSC	Mine Health and Safety Council
MHSI	Mine Health and Safety Inspectorate
MQA	Mining Qualifications Authority
ILO	International Labour Organisation
IOM	Internal Organisation for Migration

MPRDA	Minerals and Petroleum Resources Development
NEPI	National Education Policy Investigation
NGO	Non-governmental organization
NIHL	Noise-induced hearing loss
NIOH	National Institute for Occupational Health
NLC	National Literacy Cooperation
NQF	National Qualifications Framework
NSB	National standards body
NSDS	National Skills Development Strategy
OBE	Outcomes-based education
OBET	Outcomes-based education and training
ODMWA	Occupational Diseases in Mines and Works Act
OHS	Occupational health and safety
OHSA	Occupational Health and Safety Act
PAC	Pan African Congress
PPE	Personal protective equipment
R&D	Research and development
RDP	Reconstruction and Development Programme
RPL	Recognition of prior learning
SACP	South African Communist Party
SAIRR	South African Institute of Race Relations
SANLI	South African National Literacy Initiative
SAQA	South African Qualifications Authority
SETA	Sector education and training authority
SGB	Standards generating body
SIMRAC	Safety in Mines Research Advisory Committee
SR	Severity rate
TB	Tuberculosis
TWA	Time-weighted average
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
VR	Virtual-reality



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Education Management and Policy Studies

29 August 2011

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# CHAPTER 1

## INTRODUCTION TO THE STUDY

### 1.1 Introduction

#### *The research problem*

South African mines have a poor health and safety (H&S) record. The incidence of fatalities and injuries following falls of ground, during transportation, with explosives or in general mining accidents has been reduced in recent years, but is still unacceptably high. While mine fatalities are highly publicized, disabling injuries are not. Occupational diseases, especially lung diseases and noise-induced hearing loss, are pervasive. Lung disease kills many more mineworkers than do accidents. The exact extent of mortality from lung diseases such as tuberculosis (TB) and silicosis is unknown, because unrecorded numbers of migrant mineworkers simply go home to die. South Africa has a substantial body of legislation dedicated to ensuring the H&S of people at work, and the mining industry has its own dedicated legislation. In spite of extensive legislation and policy development, however, the H&S record remains poor.

The broad and complex subject of mine H&S is based upon an underlying premise, that of ‘ensuring a safe and healthy working environment in mines’ (Guild, Ehrlich, Johnston & Ross, 2001:3). The achievement of H&S is encouraged through compliance with legislation and guidelines, the use of personal protective equipment (PPE), and the provision of training and awareness programmes for employees, the focus of this study. Of particular concern are the categories of workers in the local mining sector who are most vulnerable to accidents and disease and who generally have the least formal education or training, those termed elementary workers (unskilled) and machinery operators and drivers (semi-skilled).<sup>1</sup> They constitute by far

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<sup>1</sup> Machinery operators and drivers include drillers; excavation operators; earthmoving plant operators; crane, hoist and lift operators (MQA, 2011:102). Where the term *machinery operators* is used, it includes all of these operators.

the biggest categories of workers in the industry, which I have calculated from official statistics, as being between 70 and 80% of total employees. The researched trend in terms of skills demand is that these categories of workers ‘experience a high replacement demand due to mortality related to occupational and other diseases, and accidents on duty’ (MQA, 2011:102). This study focuses on their training and preparation for dealing with the hazards of the mining workplace. Anecdotal evidence suggests that, even when H&S training happens, it does not assure compliance with documented procedures, nor does it enhance spontaneous and responsive individual or collective efficacy of workers in relation to H&S. This study aims to contribute by investigating an alternative training approach.

## 1.2 The research

### *Aim and purpose*

The main aim of this study is to inform conceptual approaches to health and safety training for elementary mineworkers in the South African context.<sup>2</sup> This is achieved by the formulation of a foundational, conceptual framework for mine H&S training that goes beyond informing workers of safe practices, but is underpinned by a rationale of developing worker self-efficacy for H&S, within the challenging context of South African mining and the wider social contexts of under-education, injury and illness. During the course of the study, the role of advocated frameworks, models or solutions comes under critical scrutiny. Three main processes are involved:

- The accepted and documented concept of self-efficacy is analysed with reference to its application to H&S training for South African mineworkers.
- A process of review and discovery identifies additional key formulations (ideas, concepts) for developing worker H&S self-efficacy in the context, by drawing on studies in related disciplines, such as adult education and training (AET), mine health and safety, health education and communication.
- A basic framework of key concepts, based upon issues of convergence and recurring themes across the literature, is collated. This includes logical consideration of those aspects of self-efficacy that can be developed by education, training and awareness programmes provided to mineworkers.

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<sup>2</sup> For the sake of brevity, the term ‘elementary mineworkers’ includes reference to workers categorised as elementary workers, machinery operators and drivers in the mining sector.

### ***Research questions***

The research is framed around the following questions:

Question 1: How can the concept of self-efficacy be applied to workplace H&S programmes for unskilled and semi-skilled workers in South Africa?

Question 2: What key formulations (concepts, ideas) from related disciplines have ‘logical relevance’ to the research issue, i.e. worker efficacy for H&S in South Africa?

Question 3: Which formulations (concepts, ideas) are key contributions to a basic, foundational framework for worker efficacy in H&S?

Question 4: Does the tentative framework have meaning in the real workplace context?

### ***Parameters***

This is a conceptual study of possible approaches to H&S training and awareness programmes.<sup>3</sup> Within the mining sector, the term *awareness* usually refers to training programmes which promote awareness or advocacy but are not formally accredited, while *training* refers to formally accredited programmes. This study includes both types of programme as foci for conceptual development and uses the term training to refer to both, simply to avoid clumsy expression.

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<sup>3</sup> It may be useful to clarify distinctions regarding the use of terms:

An **approach** is the general, overall way in which we set about our educational activities. It is influenced by what we believe about learning, about human beings, and about the purposes of education and training. Different methods may be used within one approach.

A **method** is a practical way in which we implement our teaching. A method should be an effective way of achieving the educational purpose and should fit in with the general approach. Discussion in small groups is a method. Lecturing is a method.

A **technique** is a very specific method or part of a method. For example, there are various techniques for running discussions in small groups. There are various techniques for presenting a lecture (Aitchison, 2010: Teaching notes).

As stated, the study focuses on the training of those categories of mineworkers who are most vulnerable and least educated, described as elementary workers and machinery operators. While it has much in common with conventional adult education and training studies, it departs from them in two main ways. It crosses the boundaries of different disciplines, and it introduces additional theory at the core of the research: the self-efficacy concept. The study was undertaken within the academic framework of a Ph.D registered in the department of Management and Policy Studies. Consequently, references are made to policy processes and policy logic where these have an impact on training approaches.

### **1.3 Framing the study**

#### *Elements of the topic*

The organization of mining operations also contributes to a lack of integration and conceptualization of the topic of H&S training. Production is controlled by production management, usually the mainstream management of a mine, while safety is managed by safety departments, training is provided by training sections, health education is given by health services, and adult basic education and training (ABET) is usually outsourced to private vendors. Practitioners of each department may not see any purpose in consulting the reports of other departments, let alone the literature of another discipline. In the absence of traditional parameters, the researcher is required to deconstruct the topic into its basic elements in order to identify the ‘population’ of literature streams and the terms being targeted for review (Torraco, 2005:361-362; Yorks, 2008:140). The elements of this research topic are the framing concepts that guide the study and the chapter organization. These are deceptively obvious and are clarified below:

- Mine health and safety context: Chapter 2
- Self-efficacy: Chapter 3
- Adult education and training (AET): Chapter 4
- Education and training in mining: Chapter 5
- Health promotion, communication and education: Chapter 6

The reconstruction of these elements towards a common goal constitutes the intended research outcome, aimed at informing and enlightening H&S training for mineworkers.

### *Self-efficacy*

The self-efficacy concept is central to this study because the ultimate aim is to enhance the self-efficacy of workers in relation to H&S. The great number of references available suggests that self-efficacy has developed considerably since the 1970s and is now supported by a substantial body of literature. The most prominent writer on the subject is Albert Bandura, who has published consistently for over 40 years. When the concept is used in Bandura's body of work on behaviour change, it is referred to as a theory of social cognitive learning, but when applied to other disciplines it is referred to as both a construct and a concept.<sup>4</sup> While self-efficacy emerged from studies of motivation and learning in psychology, the concept has been integrated and applied in many other disciplines. It has generated research in areas as diverse as medicine, athletics, media studies, business, social and political change, psychology, psychiatry and education (Pajares, 2002:10). The self-efficacy concept (or just the term) has been used in the South African education, training and development context with varying degrees of rigour and presumption about what it actually means. It has been used in programmes aimed at developing Defence Force officers (Stadler & Kotze, 2006), supporting previously disadvantaged university students (Wood & Olivier, 2004), teacher development (Wood & Olivier, 2008; Rudman & Webb, 2009), and measuring the entrepreneurial tendencies of different ethnic groups (Urban, 2006).

The Soul City Institute in Johannesburg is a health communication project which uses mass media, including a prime time television drama, *Soul City*, one of the most watched programmes in the country (Goldstein, Japhet, Usdin & Scheepers, 2004). The Soul City project practitioners acknowledge that self-efficacy is one of the significant theoretical influences on their work (Goldstein et al.; 2004:116).

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<sup>4</sup> Self-efficacy is referred to as a concept and a construct in different sources. Bandura's body of work is also referred to as both social cognitive theory and self-efficacy theory in different sources. Rather than engaging in a debate regarding the nature of a construct, a concept versus a theory, this study refers to self-efficacy as a concept.

The concept has also been referred to in previous studies of the health and safety behaviour of mineworkers (Goldstein, 2007; Campbell, 2003; Campbell, 1997; Campbell & Williams, 1999; HEARD, 2002). It has also been used in research into the relationship between individual and organizational efficacy in the coal mining industry (Cilliers & Kossuth, 2007a & b). This study pays more attention to the concept and its use as a conceptual tool for training and development. However, the references cited above indicate that the self-efficacy concept has been acknowledged in related educational, training and development contexts in South Africa, and support this attempt to advance and apply the concept. The concept is extensively reviewed in Chapter 3.

#### *Adult education and training (AET)*

This study is undertaken within a broad adult education and training (AET) framework. The ultimate conceptual contribution which it aims to provide is to enhance H&S education or training for adult mineworkers via the incorporation of relevant aspects of self-efficacy and related concepts. It should therefore make reasonable reference to the accepted practices of AET. My own experience also has an effect. I started working in progressive adult literacy agencies in South Africa in the 1980s and more recently moved into mine health and safety awareness. Inevitably, this study is influenced, in its orientation, values and use of language, by many years of work in adult literacy and adult basic education and training (ABET). Relevant approaches and developments in AET are reviewed in Chapter 4.

#### *Education and training in mining*

Legislation in South Africa provides legal, logistical and financial support for education and training in the mining industry. Much operator training is conducted in the mining industry, as well as adult basic and adult secondary or further education. Correlations between the formal education of workers and H&S practice are assumed, but are not explored in local mining. Levels of formal education of workers, a common language of communication, and H&S are often perceived as a single issue, that of the low education of workers, as reflected in the influential Leon Commission of Inquiry into Safety and Health in the Mining Industry (1994:70). Consequently, adult basic education and training (ABET) is offered on large mines. A risk assessment process is generally accepted as the appropriate approach to engaging with H&S

issues, and the use of computer-aided learning (CAL) has received much attention (Heyns, 2011; Creamer, 2011; Webber-Youngman & van Wyk, 2009; van Wyk; 2006; Squelch, 2001). Education and training in the mining sector is a big industry, but lacks a critical mass of quality literature. The available literature is reviewed in Chapter 5.

### *Health promotion, communication and education*

In recent years the volume of clinical research on human subjects in South Africa has increased significantly. The HIV and TB pandemics have contributed to this increase. These epidemics have impacted negatively on the mining industry; and mining companies have become increasingly interested in research initiatives that address these problems (Horn, 2007:119).

Health research in mining may be dominated by biomedical as opposed to behavioural studies. Increasingly, research is conducted to assess the effectiveness of interventions, uptake of and attitudes to health education and communication programmes, including health awareness. Such studies are often focussed on employed mineworkers, but several include the local communities in which mines are located, where mineworkers may live or spend their recreational time (Campbell, 1997 and 2003; Campbell & Williams, 1999; Williams, MacPhail, Taljaard, Gouws, Moema, Mzaidume, & Rasego, 2000). Formulations and useful ideas from relevant studies in health education and communication are reviewed in Chapter 6.

### ***Conceptual framework***

This study is a critical review of relevant and related research. Broadly, it is located in the qualitative paradigm and is an open-ended, conceptual study that seeks to articulate ideas from related disciplines and to contextualize these with ongoing reference to the demanding realities of South African mining. Local mine health and safety training is an occupation that is relatively less developed in terms of theories and concepts. One of the main intentions of the study is to address some of these conceptual inadequacies and to contribute to making mine training more intelligent and *theoretically informed*. Because of the multi-disciplinary nature of the topic, the study is not positioned neatly within a familiar conceptual framework.

Conceptual frameworks may be referred to in two separate ways in this research: firstly, in order to structure the research and, secondly, as the outcome of the research. The same duality is expressed in other studies: ‘a variety of frameworks can be used to explicate meanings’, as in delineating and clarifying the topic of this study; or as in the outcome of this study, a conceptual framework ‘will formulate and justify alternative conceptual possibilities for grounding the concept’ (Keet, 2006:42).

### ***Ethical framework***

Ethics are usually considered as an aspect of the research process. However, I believe that it is necessary at the start of this study to clarify a critical ethical issue. This research seeks to inform education and training approaches for worker H&S, but in no way seeks to exempt any stakeholders in the mining sector from their responsibility to provide a healthy and safe environment for mineworkers. In South Africa, there is a long history of blaming mineworkers when injuries occur (Phakathi, 2006:13; Frankel, 2010:91; Hermanus, 2007:537). This study acknowledges a reported position of the trade unions who ‘see the essence of controlling many otherwise preventable accidents not through expensive, condescending and ethically questionable attempts to change worker consciousness, but by addressing work conditions’ (Frankel, 2010:43). Another relevant critique is the ‘continued inability of mines to manage the seemingly simple business of protecting their workers according to international standards’ (*ibid*: 83). This study addresses a small strand in what should be a comprehensive H&S system for mineworkers: to improve the quality of training or preparation offered. It is a focused study, located within a very complex context, and thus cannot be associated with any ‘total solution’ to the multiple issues relating to the health and safety of mineworkers.

## **1.4 Research process**

### ***Integrative literature review***

The research approach, borrowed from human resource development (HRD), is referred to as an *integrative literature review* (Torraco, 2005; Yorks, 2008; Daley, Conceição, Mina, Altman, Baldor & Brown, 2010). The integrative literature review is a form of research which reviews, critiques, and synthesizes representative literature on a topic in an integrated way, such that ‘new frameworks and perspectives

on the topic are generated' (Torraco, 2005:356). The result of a comprehensive synthesis of literature is that 'new knowledge or perspective is created, despite the fact that the review summarizes previous research' (*ibid*: 362).

New theory needs to be justified on the grounds of offering potential answers to new and interesting questions not brought to light by existing theory. This justification rests on the existing literature that is being either critiqued or integrated in a new and provocative way. The same is true of integrative literature reviews; what new insights are provided, new questions asked, or answers to provocative questions suggested, by integrating previously separate literature streams (Yorks, 2008:139-140).

An integrative literature review can be classified according to the maturity of the research topic, offering re-conceptualization of a mature, expanding knowledge base, or a holistic conceptualization and synthesis of an emerging or new topic (Torraco, 2005:357). However, while the elements or literature strands constituting this topic may vary in their maturity as disciplines, their integration is a genuine attempt to find a new perspective.

### ***Appropriateness of a literature study***

The appropriateness of a literature review for this study is based on two factors: the complexities of access to mineworkers and the fact that research, because of its diverse origins, is never collated or integrated. Access to mineworkers is complicated by logistical, political and economic issues. Most large mines use an electronic system for clocking workers in and out of shifts at the entry point to the mine, similar to those used in many large industries to monitor the movements of workers.

A worker whose entry or exit is blocked knows that he or she must report to a central point to find out why. It may be a call for training, for participation in research, or for routine medical or administrative matters. This is known in local mining as a 'parade' or being 'paraded'. Mineworkers do not have a choice when they are paraded; they do whatever they are directed to do in order to regain access to or exit from the workplace. The parade system facilitates much health-related research in mining, but has been criticized in terms of research ethics:

A mineworker can thus be prevented from going to work or from clocking out post-shift until he has been seen at the medical station, clinic or hospital for any health related issue. From a researcher's point of view, it is a very useful system because workers can be 'paraded' to their follow-up appointments. ...This expedient 'parade' system reflects and sustains the hierarchical mentality in the mining context and overrides worker responsibility for keeping health care appointments. He is simply sent to where he has to go without being part of the decision-making process (Horn, 2007:123).

While the parade system may be useful in retaining contact with research participants, it places the selection and control of participants entirely at the discretion of employers. Cellular phones do not operate underground. Production issues, such as electricity or equipment failure, may also disrupt access to mines. It is extremely difficult for researchers who are not mine employees to secure access to mineworkers more than a week in advance. Many established mining groups and agencies, such as the Mine Health and Safety Council (MHSC), conduct relevant research. However, in the case of government agencies, research findings can only be accessed in special reports, on websites or particular data bases, and mining companies tend to make use of research within their own mining groups:

There are many individual mines and mining companies that aspire to a leadership role in safety enhancement, or are otherwise pace-setters for the industry. ...Yet, their experiences in reducing accidents and injuries remain largely unknown outside the operations and companies concerned, partially because lack of documentation, partially due to the absence of a tradition of knowledge-sharing (Frankel, 2010:90).

### ***Selecting the literature***

The selection of sources is naturally based on the elements of the topic or literature streams, outlined above. Apart from the analysis of self-efficacy, the selection and use of sources are deliberately biased towards the specific mining context of Southern Africa, which is often described as unique in the world. This bias is integral to the research process: to discover what works with mineworkers in this context, and to ground any conceptualization in the real context. However, the diversity presents a

challenge. Relevant sources emanate from different paradigms and traditions, including academic studies in adult education and health communication, state policy documents and legislation on AET and mine H&S, special reports on mine H&S, press reports from mine trainers, and annual reports of state agencies and multi-national mining companies.<sup>5</sup> Relevant peer-reviewed journal articles are sought wherever possible, but minor journals are also consulted. Countless imprecise power-point presentations which appeared at first to be good potential sources were excluded because the authors had neither produced written papers nor responded to direct inquiries for information. Other sources provided insights and cautions, but were excluded from the study because they advocated solutions to H&S or training of mineworkers with little or no substantial evidence. The search for relevant literature involved examining established data bases, search engines, websites, indices of journals and many different permutations of related key words.<sup>6 7</sup>

The most recent literature that could be found was used, as well as classic texts on mineworker experiences. The diversity of sources also precluded absolute criteria for inclusion or exclusion across the different streams, though the study includes those that are ‘purposeful’ and ‘representative’, rather than just one of these, as advocated by Yorks (2008:140). The process involves judgment, and the sources reviewed are those which seem to be saying things that are particularly typical, telling, well rationalized or relevant to the local mine H&S context.

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<sup>5</sup> Training sections of the Mine Health and Safety Act (MHSA) and the sectoral Mining Qualifications Authority are discussed in Chapter 5.

<sup>6</sup> Data bases and search engines include:  
Academic Search Premier, ERIC, Proquest, Medline, Social Science Index, Google.  
Websites include those of the Departments of Minerals and Energy (DME), Mining Qualifications Authority (MQA), Mine Health and Safety Council (MHSC), National Institute for Occupational Health (NIOH), South African Institute of Mining and Metallurgy (SAIMM), Chamber of Mines, and the Safety in Mines Research Advisory Committee (SIMRAC). Combinations of key words are related to mining, mineworkers, workers, health, safety, training, self-efficacy, adult education, health education, behaviour change, South Africa, etc.

<sup>7</sup> I was fortunate that I had some access to the MHSC data base before it was shut down and reconstituted in 2010. Research reports are now available at a cost of R500.00 per report.

### ***Engagement and analysis***

The study obviously required critical engagement with literature, a process of data analysis that ‘needs to be critical, not accepting, much like comments by interviewees must be probed and critically assessed’ (Yorks, 2008:140). Critique, the product of critical analysis, identifies strengths and key contributions of the literature, as well as any deficiencies, omissions, inaccuracies, and other problematic aspects of the literature.

It also identifies knowledge that should be created or improved in light of recent developments on the topic. Thus, by highlighting the strengths and identifying the deficiencies in the existing literature, critical analysis is a necessary step toward improving the knowledge base (Torraco, 2005:262).

The process of critical analysis of the literature to be used here depends on the nature of the specific source and the data presented. The process may be both deductive and inductive. However the process of synthesising different literature strands in order to formulate new perspectives is essentially an inductive process. An ideal notion of *inductive* analysis is described as one in which ‘the patterns, themes, and categories of analysis come from the data; they emerge out of the data rather than being imposed on them prior to data collection and analysis’ (Patton, 1980:306). This suggests that data are not subject to researcher bias. Quantitative data in mine H&S, even those relating to the causes of accidents, are compiled and reported in this way. However, the scope of research always involves elements of inclusion and exclusion which may reflect bias. Probing more deeply into the issues, such as the causes of H&S lapses, may require an *iterative* process or *iteration*:

The role of iteration, not as a repetitive mechanical task but as a deeply reflexive process, is key to sparking insight and developing meaning. Reflexive iteration is at the heart of visiting and revisiting the data and connecting them with emerging insights, progressively leading to refined focus and understandings. ...From our experience, however, patterns, themes, and categories do not emerge on their own. They are driven by what the inquirer wants to know and how the inquirer interprets what the data are telling her or him according to subscribed theoretical frameworks, subjective perspectives, ontological and epistemological positions, and intuitive field understandings (Srivastava & Hopwood, 2009:77).

The following three questions offer a simple framework for guiding such analysis, but the simplicity of the framework should not imply naïveté about the controversies and challenges in qualitative analysis (Srivastava & Hopwood, 2009:82):

- What are the data telling me? (Explicitly engaging with theoretical, subjective, ontological, epistemological, and field understandings)
- What is it I want to know? (According to research objectives, questions, and theoretical points of interest)
- What is the dialectical relationship between what the data are telling me and what I want to know? (Refining the focus and linking back to research questions)

(Srivastava & Hopwood, 2009:78).

### ***Research outcome***

This study does not aim to produce new theory but rather to establish valid and coherent conceptual insights by integrating existing work, creating a ‘value-added contribution to new knowledge on the topic’ (Torraco, 2005:365). The term ‘conceptual framework’ appears to have wide acceptance and reasonably consistent use across the diverse potential audiences for the outcomes of this study, presented as a coherent and related set of ideas. Other terms used loosely in the literature include ‘model’, ‘map’, ‘matrix’, and ‘schema’, though these terms have different uses in different disciplines. A concept map or matrix can be used as a stage in the process of developing conceptual frameworks, laying a foundation for further theorizing (Hay & Kinchin, 2006:130; Torraco, 2005:358).

The outcome of this research is described as a provisional conceptual framework, a specifically focused approach to H&S training of mineworkers. The definition below is useful and comprehensive because it emphasizes that conceptual frameworks are not slavish models to be replicated but serve to illuminate and broaden the process or topic under consideration, from conceptualization to practice.

Conceptual framework is defined as a network, or ‘plane’ of linked concepts that together provide a comprehensive understanding of a phenomenon. Each concept of a conceptual framework plays an ontological or epistemological role in the framework. Conceptual frameworks are not merely collections of concepts but, rather, constructs in which each concept plays an integral role. They provide not a causal/analytical setting but, rather, an interpretative approach to social reality. Finally, they are not determinist frameworks. ...The data themselves are composed of various texts addressing the social, cultural, political, or environmental phenomenon in question and the multidisciplinary literature on the subject (Jabareen, 2009:57).

## 1.5 Significance of the study

### *Relevance of the topic*

During 2005, I was commissioned by the National Institute for Occupational Health (NIOH) to review literature on modalities suitable for training mineworkers described as illiterate and semi-literate (Tuchten, 2005). While conducting this task and working on materials for mineworkers concerned with lung health awareness, I became increasingly aware of the weak conceptual and theoretical base of the mine H&S training to which I was exposed. My internet searches of mine H&S programmes on offer revealed that many such programmes are targeted at managers rather than underground workers and are designed to assist employers in understanding and implementing the requirements of the legislation in order to avoid punitive fines. Recently, training vendors have begun to advertise more H&S programmes for mineworkers, following pressure to comply with the legislation.

When I sought detail on these programmes I found that many did not really relate to mining practices, but were instead about physical fitness, fire-fighting, or first aid. The learning materials that I was able to access frequently involved informing workers of health and safety procedures, without at the same time providing them with any underlying rationale for doing so. For example, mineworkers were instructed when and where to wear masks (e.g. while using explosives for blasting), but were not educated about the impact of dust particles on lung health or the differences between diseases caused by dust (e.g. silicosis) and those caused by a bacterium (e.g. tuberculosis); this resulted in many mineworkers perceiving all the different lung diseases as one (referred to by them as phthisis). Most of the learning materials I found were produced in English at a reading level that would suit high school graduates, but not those who had not completed school or did not use English as a first language.

My own discussions with mineworkers, trade union representatives and mine personnel revealed that, even when workers were aware of the dangers to which they were exposed, many continued to take risks. Compliance with H&S procedures is low for many complex reasons, the most evident being the hasty pursuit of production bonuses. Existing H&S programmes do not appear to facilitate worker compliance with documented procedures. The efficacy, both individual and collective, of workers in relation to H&S practices remains undemonstrated, undeveloped or dormant, even after they have participated in the few relevant programmes. A more thoughtful and developmental process of facilitating health and safety efficacy that is internalized, sustained and adaptive appears to be a necessary consideration. That is where this study aims to make a contribution. Research into mine H&S is currently being conducted, especially in relation to technological innovation, environmental impact, biomedical studies and possible training modalities. An official of the Mine Health and Safety Council was not aware of any studies, other than this, being currently conducted on approaches to mine H&S training (Banyini-Mulaudzi, 2011).

## 1.6 Limitations

### *Maintaining the focus*

Research into H&S practices of workers could involve many types of quantitative variables or qualitative factors, but this study focuses only on education and training as contributions to the H&S efficacy of workers. It thus restricts its inquiry to what would constitute a more informed conceptual training approach to enhancing or developing the H&S self-efficacy of workers. Although the self-efficacy concept originated in psychology, this is not a psychological study as such, but is restricted to examining how the concept has been used in the past and how it could be applied in the future in H&S or mine education and training. The boundaries between interventions offered by adult educators and trainers and those offered by psychotherapists are quite clear. The outcome of this study should inform approaches to training, although other programme inputs, such as practitioner, curriculum and materials development, management, evaluation, assessment and language policies, remain crucial issues for further research.

## CHAPTER 2

### MINE HEALTH AND SAFETY CONTEXT

#### 2.1 Introduction

##### *Scope and purpose of the chapter*

This chapter describes the health and safety context of this study. The main mining hazards and risks are identified and South Africa's mine health and safety record is reviewed. It also refers to the wider, national, social and industrial contexts of illness and injury within which the mining sector is located. Current policy, legislation, working conditions and mine culture that affect H&S are also discussed. The purpose of such a detailed chapter on the context is to support the validity of this study by providing a comprehensive and authentic basis for theorizing and referring to appropriate approaches for training.<sup>8</sup>

#### 2.2 South African mining industry

##### *Significance of the sector*

Many of both the positive and negative features of contemporary South Africa originated in the mining industry, including a huge resource base, influential trade unions and a pernicious migrant labour system. South Africa possesses some of the world's largest known mineral reserves.<sup>8</sup>

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**Table 1: South Africa's commodity reserves in terms of world resources:**

SA ranked 1 <sup>st</sup> in the world	Ranked 2 <sup>nd</sup> in the world	Other ranked reserves
chrome gold manganese platinum group metals (PGMs)	fluorspar titanium vanadium vermiculite zirconium	coal 4th phosphate rock 4th uranium 4th diamonds 5th nickel 5th antimony 6th lead 6 <sup>th</sup>

(Source: COM,2010b:7 and SouthAfrica.info, 2009)

Though this vast and complex sector has declined in the last decade due to fluctuating commodity prices and demand, increased costs and the world economic recession, it is still significant both globally and to the South African economy. Many South African companies responded to economic and political change by globalizing, shifting their primary listings from Johannesburg to London and New York and venturing into other countries, especially in Africa (Bezuidenhout, 2008:183). In 2009, mining contributed 8,8% directly to the national Gross Domestic Product (GDP) and 19% indirectly (COM, 2010b:2). Mine finance is extremely complicated. Vast amounts of money are at play, but it is not a matter of simple profit and loss, as commodity prices have a huge impact on balance sheets. The total income of the formal mining sector was R322 billion in 2008 (*ibid*).<sup>9</sup>

### ***Employment in the sector***

The number of people directly employed in mining has stabilized at about 500 000, well below the 850 000 employed in 1985 (MQA, 2010:xiv). However, it remains the formal sector that provides the most employment. Total employment at the end of 2009 was estimated at 548 000, including both permanent employees and contract workers (MQA, 2011:10). In addition to the direct mining jobs, about 500 000 workers are estimated to be employed by the suppliers of goods and services to the industry, and at least 5 million people are believed to be dependent on the wages of mineworkers (SouthAfrica.info, 2009). In 2009, some R71 billion was paid to mineworkers in the form of salaries and wages (COM, 2010b:2). Africans constitute 86% of the total workforce and whites 13%, while only 10% of employees are women (MQA, 2011:16-17). The majority of employees in the sector (62%) work for large organizations, with 5000 or more employees, while another 34% work in smaller organizations, ranging in scale from 150 to 4999 employees (*ibid*:11).

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<sup>9</sup> The following quote indicates both the scale and complexity of local mining finance:

The total income of the South African mining sector was R322 billion, down by 8.8% on 2008. The industry's total expenditure, excluding dividends, taxes and capital expenditure, was R312 billion, implying a small gross surplus of R20 billion. However, if taxes, dividends and capital expenditure are included, the total expenditure of the mining industry was R399 billion in 2009, implying that a deficit of R67 billion was incurred (COM, 2010b:2).

It is possible to calculate from the sector skills plan that, of the 547 973 people employed in the mining sector in 2009, 400 574 were categorized as *elementary workers* or *machinery operators and drivers*, the focus of this study (*ibid*:17). Comprising over 73% of the total workforce, these workers are generally the least formally trained, but the most consistently exposed to H&S hazards. The proportion of workers underground is also much higher in gold mines (DME, 2008:14).

## 2.3 Working conditions and culture

This section aims to describe aspects of current mine culture and working conditions that affect health and safety. In order to discuss trends and tendencies, it is necessary to rely on generalizations and accepted stereotypes. I am reluctant to describe mining personnel at any level in terms of stereotypes, but much of the literature that does so also provides useful ideas and insights.

### *Migrancy*

Each year, for well over a century, hundreds of thousands of men from rural areas of South Africa and neighboring countries have come to seek work in the mining sector. They are not immigrants in the usual sense, as they work for periods in the mines, go home and then return. This is termed oscillating or circular migration (Rees, Murray, Nelson & Sonnenberg, 2009a:398). The migrant worker system on the mines was a product of nineteenth-century colonialism and mercenary attitudes to the exploitation of people and resources. Local mining conditions presented challenges in terms of the depth of mining required and the matrix of hard rock in which precious metals and minerals were found. Early South African mining magnates responded, as many still do today, by seeking cheap labour from the entire sub-region:

It wasn't just the material wealth that Rhodes and company needed from the neighbouring countries. There was a major problem with the gold on the Rand. The geologists quickly found that most of the gold was deep underground, embedded as tiny speckles in huge volumes of hard quartz matrix (only 10 g of gold in 1 tonne of ore). The deeper the gold, the more expensive it was to mine. ... South African mines needed manpower from neighbouring countries (Hargrove, 2008:57).

Subsequent policy and legislation entrenched a system of migrancy and inequality. The Mines and Works Act of 1911 (amended and extended in 1924) formalized job reservation, with the result that skilled jobs could not be offered to African mineworkers. Other statutes, such as the 1913 Native Land Act, the 1920 Native Affairs Act and the 1923 Urban Areas Act, limited the land ownership, entrepreneurial opportunities and movement of people, entrenching racial discrimination, white supremacy and migrant labour within the industry. Black workers lived in single-sex hostels, while their families were forced to remain in ‘homelands’ or neighbouring countries (Oakes, 1988:264-265; Horn, 2007:123). Over 100 000 foreign workers continue to be employed by South African gold, platinum and coal mines each year (Rees et al., 2009a:399). Approximately half the gross national product of Mozambique and Lesotho comprises mineworkers’ remittances; foreign countries thus have an interest in preserving the current system. Migration of workers from rural areas within South Africa and from neighbouring countries remains an ongoing feature of mine employment. A migrant lifestyle has been associated with social disruption and a range of negative consequences, including the denial of normal family life, break-up of marriages, and poor living conditions in single-sex hostels (DME, 1998). ‘Although much has been published on the linkages between migrancy and health, the mining industry itself seems to lack awareness of the seriousness and long-term implications of the matter’ (Rees et al., 2009a:403). The system aggravates indifference to health and safety on many levels, as revealed in research into the health awareness of workers in relation to dust and silicosis:

In focus group discussions, health and safety representatives stressed that migrant workers ‘are here only for the money and no other reason’, which exacerbates the tension between the pursuit of bonuses and working safely. ...Health specialists speculated that workers who grow up in traditional mining communities, such as the coal fields of Britain, are more likely to be exposed to cautions about lung disease in their indigenous knowledge systems than migrant workers (MHSC, 2009b:41).

### ***Hierarchies and control***

Obviously much has changed since the dismantling of apartheid in 1994 but a hierarchical system of racial subordination, built over a period of more than 100 years, unfortunately still casts a shadow over the industry. The mining industry, like the military, is an hierarchical organization, with all jobs classified into groups or grades according to skill and responsibility. Status and privileges such as accommodation and bonuses are usually awarded according to these categories (Horn, 2007:122).

The electronic ‘parade’ system referred to in Chapter one and the rigid hierarchy in mining maintain a form of control over mineworkers that can be inflexible and anonymous, reinforcing long-held feelings of powerlessness in relation to the workplace. Attitudes associated with a lack of power or control have frequently been described as contributing to lapses in mine H&S (Campbell, 1997 and 2004; Campbell & Williams, 1999; Williams, MacPhail, Taljaard, Gouws, Moema, Mzaidume & Rasego, 2000; Frankel, 2010). ‘Among men employed on the mines, levels of self-efficacy associated with health-promoting behaviour appeared to be low: high levels of disease and injury were regarded as the norm, and miners felt that there was little that they could do to protect their health in their unhealthy and dangerous working and living conditions’ (Williams et al., 2000:352). Furthermore, weakened efficacy in terms of H&S appears aggravated by the pursuit of production bonuses and by masculine bravado.

### ***Production bonuses***

Mines all over the world are production driven. There are many accounts in Dunbar Moodie (1994) of how workers were physically abused by the strongest and highest-paid member of the team to reach production targets. This has changed over the years:

The physical violence needed to generate regular outputs of rock is very much a thing of the past - but by no means at the smaller mines outside the public spotlight. This has been replaced with economic inducements as well as more subtle and possibly even more painful psychological instruments of control whose purpose is to reinforce the compulsion to work (Frankel, 2010:25).

A mineworker who works extra-long hours at a fast pace to reach optimum production targets can treble or even quadruple his basic wage, though the calculation of bonuses varies from mine to mine. A formal survey in the mining sector found that a significant proportion of employees believe it is *necessary* to cut corners to achieve production goals, indicating a high level of risk-taking (Hill & Pitzer, 2005:27). Production goals are formulated by management, who hardly ever venture underground, and are then communicated to supervisors and ‘team leaders’ to be achieved. It is widely reported that team leaders prioritize production over safety (Frankel, 2010:25-26; Campbell, 2003:28-29; Hill & Pitzer, 2005:27). ‘We know from interviews and observation that supervisors, teams leaders and members can be extremely vicious to co-workers who fail to perform in the most efficacious (if dangerous) way, or who otherwise inhibit the group urge to reach or go beyond production targets (Frankel, 2010:25). Examples of reported censure are:

- It is not infrequent for new or questioning members of teams, particularly those who do not conform to the stereotype of the burly miner, to be assigned the most dangerous work as part of underground initiation. This is sometimes with the connivance, or under the authority, of the supervisor (*ibid*).
- There are many cases where fearful operators who have refused to accelerate production with the conventionalized short-cuts, have been called up and ‘dealt with’ once teams have reached the safety of the sunshine. This includes physical assault by co-workers in the compounds or other habitats where operators spend their off-shift hours (*ibid*).

It is not possible to gauge the pervasiveness of such behaviour, but production-driven supervisors are clearly a weak link in mine H&S. A clear chain of command may be necessary underground. Yet the recurrence of such anecdotal evidence indicates that specific training for team leaders on how to balance H&S and production pressures is a priority. H&S lapses are spoken about quite freely in the industry, and a few examples relating to lung health follow. *Re-entry times*: I have been told that ‘nobody’ working underground waits for the mandatory three hours for dust to settle after blasting, before re-entering the work area. Thus large amounts of noxious dust particles are inhaled.

*Watering-down:* mineworkers are advised to water down the work area repeatedly during a shift to settle the dust, but are reluctant to interrupt production tasks to do so.

*Ventilation:* two members of each panel or team of mineworkers (about five people) are responsible for extending ventilation along mined tunnels to the development end, where ore is currently being excavated. Each mine has a standard regarding how far this ventilation should be extended, usually 12-15 metres from the farthest end currently being mined. In order not to waste time, ventilation pipes/columns are often not extended and thus end up to 60-100 metres from where the team is working, leaving them to breathe the limited air available. These are all time-consuming procedures. Yet simply changing the bonus system is not necessarily the solution. The bonus system is used in mining in many parts of the world, even those with optimal H&S rates. Unionized workers elect to work with the system because of the potential for much higher income: ‘Our miners towards the bottom of the socio-economic hierarchy are far less attracted to safety bonuses than their international counterparts who have relatively greater skills and opportunities to transfer out of the industry along their career trajectory’ (Frankel, 2010:26).

### ***Masculinity or machismo***

Most mineworkers are young men who risk their lives daily by going deep underground to look for metals. Many work 12-hour shifts per day with only short breaks for 10 days in a row. Exposed to hazardous working conditions and the risk of physical injury, mineworkers tend to preoccupy themselves with other immediate challenges and may regard HIV as a distant threat. In such conditions, there exists a strong form of masculine identity which encourages high levels of sexual activity and alcohol and drug use as a way of dealing with the stressful lifestyle. Such risk-taking mentality is further aggravated by mineworkers’ sense of lack of control over their life circumstances, absence of social constraints that prevail at home, and poor living conditions (IOM, 2010:10).

Much has been written about the interplay of mineworker conceptions of masculinity and risk-taking in relation to HIV (Campbell, 1997 and 2003; Campbell & Williams, 1999; Williams et al.; 2000). However, assertive masculinity and risk-taking are probably relevant to many H&S issues.

‘Masculine identities serve as an important coping mechanism whereby miners deal with the stresses and dangers of their working lives’ (Campbell & Williams, 1999:22; Campbell, 2003:32). Interviews on a local gold mine revealed typical attitudes: ‘A man was someone who had the responsibility of supporting his family and hence had no choice but to put up with the risks and stresses of working underground. ‘A man was someone who was brave enough to withstand the rigours of the job,’ (Campbell, 1997:278 and 2003:32). The masculine identities and actions of local mineworkers may also have specific cultural influences: ‘In the highly patriarchal rural communities from which many mine workers originate, one of the main pillars of masculine identity construction is participation in homestead and family leadership. ‘In the particular context of life on the mines, many migrants are deprived of such key markers of masculinity,’ (Campbell, 1997:279; 2003:34). Yet certain forms of risk-taking and of aggressive and macho masculinity are common amongst communities of working men in a range of contexts and occupations, such as shipping, policing and the military. It may be a matter of degree, but it is not peculiar to South Africa or to mineworkers. ‘Safety is frequently seen as a ‘soft’ value, not only in local mining but in other industries such as deep sea oil drilling and the production of petro-chemicals’ (Frankel, 2010:24).

### ***Black Economic Empowerment (BEE)***

The mining industry is seen as one of the key drivers of Black Economic Empowerment (BEE), as it was one of the first sectors in which substantial black empowerment deals were struck (Bezuidenhout, 2008:183). It is also described as the largest contributor by value to BEE in the economy, in terms of the value of BEE transactions completed (COM, 2010b:2). The transformative potential of BEE has been challenged in terms of its positive effect on underground mineworkers. Analysis has identified tensions between contesting notions of BEE: ‘One notion primarily focuses on black ownership. ...The other argues for a more holistic approach viewing issues such as decent employment standards, skills development and employment equity as ways to overcome apartheid,’(Bezuidenhout, 2008:186). Further legislation relating to employment equity requires that by 2014 a minimum of 40% of a company’s employees at executive, senior management, core and critical skills, middle management and junior management levels should be historically disadvantaged South Africans (MQA, 2009: xvii).

However, such wider empowerment legislation does not equate with change for the average mineworker, since there are relatively few managers at all levels across the industry. In 2009, managers comprised only 2% and professionals 4% of total employment, while technicians and trade workers formed 14% of the workforce (MQA, 2009:41). An even lower proportion of managers ever go underground. ‘With a few singular exceptions, few team leaders, front-line supervisors, shift bosses and other supervisory personnel figure in the death statistics’ (Frankel, 2010:9).

### ***Contracts***

The use of contract labour in the mining sector has increased dramatically since the 1990s. For the majority of South African mineworkers, a standard contract of employment was something that was fought for over decades (Bezuidenhout, 2008:187). Yet one out of every three mineworkers is now employed by a contractor other than the company that owns the mine (*ibid*:189). Casualization usually involves a shift from full-time employment to part-time, fixed-term casual or piece work, often effected through a labour broker. Contract working conditions are no longer subject to regulation by the state or other agencies, and workers do not have benefits, such as training and medical monitoring. The lack of training applies to H&S training as well as to regular upgrading of skills in terms of newer and safer technology. Contract workers are often offered more dangerous work for lower wages and are not permitted to join trade unions (*ibid*:194-196). The reasons for the rise in contract employment in the last decade could not be addressed in this review.

### ***Multinationals***

A related concern regarding mine culture is the H&S of multinational corporations. Some multinationals report that their South African operations have the worst H&S safety rates, bringing down the group’s international profile, and thus providing incentive for initiatives (Frankel, 2010:12-17). However, research into the experiences of mineworkers revealed that certain companies may be more mindful of H&S issues when operating in South Africa than when operating in other African countries, particularly Zambia, Zimbabwe and Tanzania (Jauch, 2007:13-14; Eweje, 2006:175).

Multinational mining companies have been accused of double standards in not complying with mining regulations in developing countries, as they would have done in developed countries. Even though the managers of MNEs interviewed in South Africa denied this allegation, other stakeholders such as the unions, the press and producing communities argue that this is indeed the case. They alleged that MNEs take advantage of discrepancies in host countries in order to pursue a profit (Eweje, 2006:175).

## 2.4 Health and safety context

### *National context*

South Africa as a country has high recorded levels of accidental injury, interpersonal violence and ill-health due to HIV Aids. This means that the national context presents a dysfunctional base from which to develop mine health and safety efficacy. The same can be said of local industry generally, which also has a relatively poor H&S record. The population is generally described as unhealthy, mainly due to HIV Aids. South Africa has the largest number of people living with HIV in the world. UNAIDS/WHO estimate that at the end of 2007 there were 5.7 million people living with HIV in the country, including 3.2 million women and 280,000 children aged 0-14. There is significant variation in HIV prevalence by province, ranging from 39.1% in KwaZulu-Natal to 15.1% in the Western Cape. Inter-district HIV prevalence variation in the country is between 46% and 5.3% (UNAIDS, 2010:n.p.). Oscillating migration influences HIV spread by creating a social and economic system that encourages multiple partners and concurrent partnerships. Thus, industries that rely on migrant labour (mining, heavy engineering, metal processing, and transport) appear to have the highest burdens of HIV, above the national average of 18.8% in the adult population aged 15–49 years (Rees et al., 2009a:401). The migrant lifestyle of many mineworkers, living in single-sex hostels, separated from their wives and families for long periods, has been associated with increased HIV rates (*ibid*). It is estimated that 27% of workers in gold mining and 24,6 % of workers in platinum mining are HIV positive (*ibid*:5). Over the last decade, the prevalence of HIV in the mining industry has exacerbated the pattern of occupational diseases, especially those which are infective, such as TB. Nationally, South Africa is also regarded as relatively unsafe.

The injury profile of South Africa, i.e. rates and causes of fatal and disabling injuries, has been compared to those of developing countries in Africa, Latin America and Asia (Norman, Matzopoulos, Groenewald & Bradshaw, 2007). The findings revealed high intentional and unintentional injury rates in South Africa. Apart from road traffic accidents, unintentional injury rates in South Africa were comparable with those resulting from fire and floods. In contrast to other regions, South African homicide rates were greater than road traffic and suicide rates, though none of these could be considered low (Norman et al.; 2007: 697). Relevant findings were:

- South Africa has by far the highest rates of interpersonal violence. The age-standardized homicide rate (64.8 per 100 000) places South Africa among the most violent countries in the world, with homicide rates slightly higher than those reported in Colombia (60 per 100 000). Age-standardized mortality rates related to interpersonal violence are seven times the global rate (*ibid*: 695-697).
- The South African road traffic fatality rate is higher than for any WHO region, almost double the global average, and road traffic injuries are higher than in the African and South-East Asia regions. This high burden is caused by unsafe road environments, poor enforcement of existing traffic laws, road rage, aggressive driving and misuse of alcohol (*ibid*: 698).
- High levels of gender-based violence are evident in female homicide rates. South Africa has the highest reported intimate female homicide rate in the world (*ibid*: 697).

Risks are even higher for mineworkers, because they fall within the population group most vulnerable to homicide and accident, i.e. young males. Homicide rates for young South African males are nine times the global rates, while assessments of the comparative burden of disease have revealed the substantial role of injuries in premature mortality and disability among young adults in Africa, particularly males (*ibid*: 695-696).

### ***Industrial context***

South African industry generally does not have a good health and safety record. Several national commissions of inquiry have attempted to investigate occupational H&S in South Africa, the most influential being the Benjamin and Greef Committee (1997). Two findings of the Benjamin and Greef Committee recur in subsequent research:

- Occupational accidents and work-related ill-health impose a considerable cost on the South African economy and society (*ibid*:3);
- There is inadequate reporting of occupational accidents and, to a greater extent, of work-related ill-health. This prevents the determination of the full extent of these problems and the development of preventive strategies, and deprives employees of compensation benefits (*ibid*:4).

A more recent study describes South Africa as a country in which it is estimated that 9% of men and 5% of women annually report suffering from a work-related injury or disease, with an accident rate of 33,4 per 1000 workers (Naidoo, Jeebhay, Robins, Myers, Nogueira & Zeleznik, 2006:392). Australian occupational H&S statistics available for 2007/8 cite a rate of 13,8 serious incidents, including both injuries and illness, per 1000 employees (Safe Work, 2011:3). With reference to the wider southern African region: ‘Occupational injuries and fatalities, and especially occupational diseases, are believed to be grossly underestimated in the currently reported data. Actual occupational disease rates are estimated to be 50 times higher than the reported rates’ (Naidoo et al.; 2006:393). Possible explanations for this are the high proportion of people, over 60%, who work in the informal sector and agriculture. The growth of the informal mining sector is discussed later in this chapter. Only 11 to 18% of workplaces in South Africa provide any form of occupational health service, while the figure is even lower in other countries in the Southern African region (*ibid*:393).

### ***Effect of the contexts***

The country’s context of violence, injury and illness creates layers of hazard in which citizens become inured to danger and risk, even defeated by it, perceiving these as part of the inevitable burden of work and life.

Health workers describe a sense of fatalism, as opposed to self-efficacy. There is also a general culture of impunity in the country, evident in small ways in incidents such as traffic violations and, at higher echelons, in corruption. These attitudes and behaviours in society have a negative spill-over effect in the workplace, including the mining workplace, engendering risk-taking and countering compliance with H&S guidelines:

Many of the values about life, occupational behaviour and risk-taking derive from these external sources and are then transmitted, no matter the barriers, into the workplace. This includes world-views conditioned by life in high-risk communities from which workers trek into the mines, as well as more tangible factors salient to safe work behaviour (Frankel, 2010:31).

The Leon Commission of Inquiry into Safety and Health in the Mining Industry (1994) made a comparable observation, referring to ‘this sad South African syndrome that life is a little cheaper in South Africa than elsewhere’ (Leon et al.; 1994:74). The response of the Leon commission was pithy: ‘It is important to remain optimistic’ (*ibid*:74). A more productive policy may be to learn from other disciplines engaging with personal and community values and behaviour towards health, safety and injury. Widespread injury and disease provide dysfunctional starting points for developing worker efficacy for H&S and require acknowledgement in training programmes. This issue is discussed further in Chapter 6 in relation to health promotion and communication.

## 2.5 Overview of mine health and safety

### *Introduction*

Mine health and safety has been intensively researched, in comparison to other industrial sectors in South Africa. The Leon Commission (1994) informed much current legislation and policy. Information and data were updated in the more recent Presidential Mine Health and Safety Audit (DME, 2008). Comparisons across different industries are problematic, due to the differing nature of the work involved, but mining has been described as the second most dangerous industry in South Africa.

The severity rate (SR) in industry is a widely used calculation, indicating the number of days lost due to accidents for every 1000 hours worked. The mining industry SR is the second highest, after fishing, and is followed by transport and construction, indicating that these are the four most hazardous industries in South Africa (Smallwood & Haupt, 2005:3). Based on serious claims per employee: Australian mining is regarded as the seventh most dangerous sector in that country, after transport, agriculture and fishing; transport and storage; manufacturing; construction; personal and other services; and wholesale trade, but remains more unsafe than the average industrial sector in Australia (Safe work, 2011:7).

### ***South African mining conditions***

South African mining operations vary from small open quarries, where workers use hand tools, to highly sophisticated and mechanized systems operating at depths of four kilometers underground. All of these operations are considered mines and are theoretically subject to the same legislation. Particular mining methods and working conditions are informed by the depth of the ore, the geometry of the ore body, the physical properties of the rock being mined, and the available resources or technologies. These factors determine whether labour-intensive, capital-intensive, underground or surface methods are used. Most minerals in South Africa, except for coal, require labour-intensive, deep underground mining. South African mines are relatively labour-intensive, when compared to similar operations in countries like Australia and Canada. This is because most of the precious metals mined here, especially gold, occur in the form of tiny particles in huge volumes of hard quartz matrix, requiring labour-intensive mining methods (Hargrove, 2008:57). Labour-intensive, as opposed to capital-intensive mining provides much needed employment but exposes comparatively more workers to underground hazards. In South African gold mines, about 84% of employees work underground, whereas across the mining industry as a whole about 60% of employees are underground workers (DME, 2008:14). South African mines are deeper than those in other parts of the world. Local gold mines are by far the deepest in the world, with many working places as deep as 4 km. Half of the entire mining workforce is by definition employed in deep mines, i.e., at depths greater than 1,5 km, which means that relatively high numbers of workers are exposed to high-risk conditions (*ibid*: 15).

Associated with these depths, are fall of ground, rock bursts and seismic activities due to pressure built up in the rock mass. ...As mines go deeper, the problem of seismicity and seismicity-induced fall of ground will no doubt increase. Currently, there is no way that the enforcement authority can get access to seismic information for proactive prevention work. This information is often only made available by mines after injuries and deaths and cannot be relied on because it always indicates that there were no major warnings before the main incidents that injure and claims lives (*ibid*: 15).

Additional to concerns about seismic activity is the fact that deep mines are also less healthy because the management of ventilation, temperature control and overall technical maintenance are more difficult. H&S is also compromised by the large number of workers on a single mine, which presents significant organizational and logistical challenges (Hermanus, 2007:532). A greater number of South African workers are exposed to health and safety risks than their counterparts in other parts of the mining world (DME, 2008:12). Local mining conditions are sometimes used to challenge comparisons with the mine health and safety achievements of other developed countries, but the technically demanding conditions of South African mining logically require a sophisticated and comprehensive H&S system.

### ***Health and safety divide***

Occupational health and safety are usually dealt with as two separate domains in mine reports, with relevant information being accessed in different places and formats. Although occupational health is a much greater problem for mineworkers, accidents attract more attention, both within the sector from workers, managers and trade union officials and from outside the sector from the state, the media and the public. Mineworkers (and H&S representatives) report that their biggest fear underground is of rock falls (Campbell, 1997 and 2003:29; MHSC, 2009b:31). These accidents are usually fatal, and are naturally more tangible issues to engage with than insidious illness. The MHSC state that inspectors in the field still consider safety issues to be of paramount importance, with occupational health coming a distant second: ‘An influencing factor is that many mining inspectors feel that occupational health is the realm of other specialist occupational hygiene or medical inspectors’ (MHSC and Resolve, 2003:10). The slower onset of disease is also relevant:

Manifestation of disease is not uniform in all individuals exposed to the same working conditions. Disease may be the result of a number of causes, some of which are specific to the workplace and others unrelated to occupation. More often occupational and lifestyle effects co-exist in the causation of disease, for example smoking and silicosis. The relationship between exposure and manifestations of the detectable health effects is complicated by the long period before the health effect can manifest itself (DME, 2008: 27).

While the neglect of occupational health is widely acknowledged, it remains a serious gap in local H&S policy, practice and training.

## 2.6 Mine safety

### *Safety hazards*

The literature on mine H&S makes clear distinctions between hazards and risks. Hazard is the potential to cause harm. Risk, on the other hand, is the likelihood of that harm occurring (NIOSH website, 2009). The main *safety* hazards in the local mines are comparable across the four biggest sectors, those of gold, platinum, coal, and diamonds. Mining gold and platinum in particular involves very similar conditions.

**Table 2: Occupational safety hazards in different mining sectors**

Gold and Platinum	Coal	Diamonds
Rock falls/ rock bursts as a result of mining depths	Rock falls	Mud rushes
Machines coming into contact with persons in confined spaces	Coal dust explosions	Air blasts
Falling materials & rolling rocks	Methane explosions	Machines coming into contact with persons
Inundations by mud or broken rocks	Machines coming into contact with persons	Rock falls
Falling into excavations / from structures	Fires from spontaneous combustion	Rolling rocks (from draw points)
Exposure to dust, gases, fumes	Falling into or from excavations	Falling into or from structures
Explosions and fires		Vehicle accidents
Seismicity		
High temperatures (up to 58°C if uncontrolled)		

(Source: DME, 2008:16-18)

Over the long term, the biggest contributor to fatal mine accidents is the fall of rock or ground due to the depth of South African mines, with transportation accidents being the second biggest risk (MHSC, 2009a:2). Mine accidents invariably involve the lower-grade operators who make up the bulk of mine labour - drillers, winch and scraper personnel appearing to be most at risk. Fatal accidents occur most frequently amongst mineworkers aged 40-49, many of whom have been underground for many years (Frankel, 2010:8-9). It is not possible to suggest a connection to training or experience on these indicators. Different factors contribute to fatal accidents at different times, but an overall trend is presented below:

<b>Table 3: Causes of fatal mine accidents 2004-2008</b>	<b>Number of fatalities</b>
Fall of ground	400
Transportation	250
General (includes falling from heights, mud slides and drowning)	221
Machinery	63
Explosives	25
Electricity	24
Conveyance Accidents	18
Miscellaneous	16
Fire	13
General Heat Sickness	4
Diving Sickness	3

(Source: Frankel, 2010:6)

### ***Causes of mine accidents***

Apart from the fall of rock or ground, mine accidents generally involve elements of human control or error which confirm a role for self-efficacy. Human factors are further indicated in the timing of accidents. For example, analysis of the time frames for accidents in the Anglo Platinum mines revealed that the highest rates of accidents seemed to occur immediately prior to or during the period of high public holidays in April and May (Easter, Freedom Day and Workers' Day) and just prior to the Christmas holiday period, for which the following explanation is offered:

There are two likely influences on this trend, that workers are distracted by the prospect of a break and therefore lose their safety focus, and that the production tempo is raised by management to offset the loss in production during the two holiday periods (van Wyk, 2008:57-58). Although this pattern presents the situation at Anglo Platinum, industry safety experts agree that it reflects an industry-wide pattern (*ibid*:57). Accidents are also reported to occur at the beginning and end of work shifts:

Many mining accidents also occur either soon after the beginning of a shift or towards its end. In the latter case this is often related to the fact that the preceding shift has not tidied the physical mess that occurs with mining, or because the new shift has not been warned of unmitigated hazards that have been encountered. The new team may then casually proceed with its daily blast that literally ‘brings the house down’. Accidents occur towards the end of shifts, some of which extend over the normal eight hours. In these cases fatigue wears down hazard-recognition capability, or induces people to circumvent an imminent danger in their haste to return to the surface. Night-shift accidents can occur for the same reasons or because front-line supervision is too thin to allow risk consultation between operators and their immediate superiors (Frankel, 2010:38).

### ***Mine safety rates***

Over the long term, South African mine safety is improving, probably due to improved mining methods. Mine safety statistics for the 1980s reported annual fatalities of 700-800 mine workers each year. More recent statistics suggest that about 200 mine workers are killed in accidents in the formal mining sector each year as revealed in the next table:

**Table 4: Mine accidents in South Africa**

Year	Fatalities	Rate per 1000 workers	Fatality rate per million hours worked
1999	309	0,76	0,34
2000	285	0,72	0,33
2001	288	0,75	0,34
2002	290	0,75	0,34
2003	270	0,65	0,29
2004	246	0,56	0,25
2005	201	0,45	0,20
2006	199	0,44	0,20
2007	220	0,45	0,21
2008	171		0,15
2009	167		0,16

(Sources: DME, 2010:72; COM, 2010b:1; DME, 2008:20)

Reportable injuries were 3 750 for 2008 and 3 672 for 2009 (DME, 2010:73), though this probably understates the true position because of under-reporting of non-fatal accidents. Some of these injuries were amputations of limbs that translate into loss of an ability to earn an income, loss of quality of life and increased medical bills (DME, 2008:5). The total number of fatal and disabling accidents appears to decrease over time, but these statistics can be misleading, as the total number of workers employed in the mining sector varies substantially with the rise and fall of commodity prices, especially gold and platinum. In order to establish trends, analysts usually use the industry fatality rate per million hours worked:

<b>Table 5: Mine fatality rate per million hours worked (2008)</b>		
<b>Sector</b>	<b>South Africa</b>	<b>International Benchmarks</b>
Gold	0,25	0,09
Platinum	0,10	0,04
Coal	0,17	0,04
Other sectors	0,13	0,04

(Source: Frankel, 2010:15)

### ***Comparative safety rates***

Because of the depth of the workings and the differences in the mining conditions, comparative analyses of mine safety are often dismissed by local mining practitioners. Such comparisons are also unhelpful when used by mineworkers or managers to berate each other during labour disputes. Within the work context, many levels of employees are subject to production pressures from higher levels of management, while operating within the wider national environment of poverty and exposure to and tolerance of injury and ill health. Comparative statistics are most constructively used to set international benchmarks and targets. Yet the H&S record of the South African mining sector is poor, when compared to mines in developed countries such as Australia and Canada. ‘Comparison of Australian and South African rates suggest that miners are 4–5 times more likely to lose their lives in mine accidents in South Africa than in Australia’ (Hermanus, 2007:532). In general, South African mining is considered to be considerably less safe than in the United States, Australia and Canada, but much safer than countries such as Russia, India, China, especially Chinese coal mining, and parts of Indonesia, South America and Eastern Europe (Frankel, 2010:11). Accurate statistics are not available.

Outside the ‘First World’ mining injuries are appallingly high. This includes India and China where the extraction of minerals and metals takes place at some of the most dangerous sites on earth. Curiously, Turkey has the highest ratio of mining injuries to deaths apparently because of the high incidence of head injuries in low-slung shafts (Frankel, 2010: xiii).

## **2.7 Occupational health**

### ***Occupational health burden***

Mine safety is more widely reported than occupational health, as many countries do not have comprehensive sources of occupational health data. The reliability of such data is especially a problem in developing countries, where reporting systems and reporting criteria are not well established (Hermanus, 2007:533).

Even the recent and comprehensive Presidential Audit (DME, 2008) dealt with occupational health much more generally and briefly than safety, though surveillance of occupational diseases is improving. According to the Presidential Audit, the general incidence of mining occupational diseases appeared to rise between 2006 and 2007, but this has been ascribed to increased compliance, an increase in the reporting of diseases, and early recognition of occupational diseases in an effort to eradicate them by 2013. ‘A total number of 493 annual medical reports have been submitted for the year 2007-2008 as compared to the previous reporting period, where only 226 mines submitted annual reports in terms of section 16 of the Act,’ (DME, 2008:32-33). Policy implementation of the MHSAs has brought about better surveillance, if not actual occupational health achievements. Accurate occupational health data may not be available for South African mines, but there is extensive evidence that the health burden of mineworkers is very bad. A sample is presented here. According to Hermanus (2007), the International Labour Organisation (ILO) estimated that the total number of occupational disease-related deaths in South Africa was 8229 in 2001. Available data suggest that a disproportionate number of these would relate to workers employed in mining and that there is a huge burden of occupational disease among former and current miners (Hermanus, 2007:533). According to research conducted at the National Institute for Occupational Health, about 167 workers were killed in mine accidents in 2009, but at least 669 current or ex-mineworkers died of respiratory illness according to autopsy data (Murray, 2011: Personal Communication). Real numbers are probably much higher because sick workers elect to return to their places of origin. Clearly, many more workers suffer and die from lung disease than in mine accidents. Every year, many more workers are removed from higher-paid underground work as a result of occupational diseases than because of injuries, as shown in the table below, which states the reasons why workers were removed from physically demanding work. Current statistics are not always available:

<b>Table 6: Mine workers: Occupations changed due to occupational disease or accident (all mines)</b>		
Year	Occupational disease	Accident
2005	1530	398
2006	1114	377

(Source: DME, 2009b:n.p.)

### ***Health hazards and risks***

The occupational health hazards in South African mines generally are listed as:

- Heat due to rock temperatures at depth
- Exposure to silica dust, the result of breaking up quartz, which is the most common substance in the earth's crust
- Noise, often made worse by confined spaces
- Vibration from machinery
- Ionizing radiation
- Exposure to chemicals in refining processes
- Other airborne pollutants, such as chemical fumes, coal dust

(DME, 2008:27; Hermanus, 2007:534).

These hazards can result in the following occupational diseases which occur across the different sectors of the mining industry in the following order of frequency: (DME, 2008:33):

1. Pulmonary Tuberculosis - usually referred to as tuberculosis (TB) - is a lung disease caused by infection with an inhaled bacterium, *Mycobacterium Tuberculosis*.
2. Noise-Induced Hearing Loss (NIHL).
3. Silicosis - previously known as phthisis - is scarring of the lungs due to inhalation over a long period of dust containing silica crystals. As the scarring increases, the lungs are less able to function properly.
4. Silico-Tuberculosis - refers to Pulmonary Tuberculosis (TB) in a person with established silicosis. The interaction between the two diseases is very damaging to the lungs.

Other reported conditions include heat stress, skin disorders, eye damage, emphysema, asthma, musculoskeletal and neurological disorders - especially damage to the hands and arms due to vibrating drills - and decompression illness associated with undersea mining. Mineworkers infected with HIV generally have low tolerances to other occupational hazards, such as heat exposure (an increasing number of heat-exhaustion cases are being reported), as well as longer recovery times after accidents (van Wyk, 2008:59).

Psychological health or well-being of mineworkers in terms of substance abuse and stress disorders are considered common. Accounts of frustration, anger, anxiety, depression, nightmares, all symptomatic of post-traumatic stress, are reported for years after involvement in or exposure to mine accidents (Frankel, 2010: xiii; Campbell, 2003:29-30). Yet the recommended textbook on mine H&S provides a comprehensive account of physical health issues, but does not mention mental or psychological health at all.<sup>10</sup>

### ***Tuberculosis (TB)***

TB is caused by a bacterium and thus has not always been regarded as an occupational disease, although it is the most common cause of illness and death in South African mining, killing more than twice as many mineworkers as occupational accidents. Between 2% and 4% of the workforce are reported to develop the disease every year (Sonica, 2006: n.p.). The highest recorded rates of tuberculosis (TB) worldwide occur in South African gold miners (Rees, Murray & Grainger, 2011:14). TB prevalence increases steadily from 806 per 100 000 in 1991 to 3 821 per 100 000 in 2004 (Rees et al., 2009a:401). Autopsies conducted on men who died working on the mines revealed that 40% suffered from TB (Bateman, 2009:852). According to the Chamber of Mines, 4 639 cases of occupational TB were reported in the industry in 2008 (COM, 2010a:129). The susceptibility of mineworkers to TB is compounded by several factors: living in close proximity, lungs weakened by dust exposure, rising drug resistance and reduced immunity due to HIV. Many studies report that exposure to dust predisposes workers to TB, even when they do not actually develop silicosis (Hnizdo & Murray, 1998; Te Water Naude et al., 2006; MHSC, 2003; Roberts, 2009:50-51). It is also well known that HIV infection increases the incidence of TB, both through the increased risk of reactivation of latent TB infection and through more rapid progression from infection to disease (Rees et al., 2009a:402).

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<sup>10</sup> See: Guild, R., Ehrlich, R., Johnston, J. & Ross, M. (Eds.) (2001). Handbook of Occupational Health Practice in the South African Mining Industry. Johannesburg: The Safety in Mines Research Advisory Committee (SIMRAC).

Among gold miners, the increase in TB case notification rates has occurred in parallel with the increasing prevalence of HIV infection, and it can be expected that TB incidence rates among miners will continue to increase during the next decade, unless effective control methods can be identified and implemented (Guild, Ehrlich, Johnston & Ross, 2001:156-157). Clinical trials for preventative drug therapy for TB are currently being undertaken in the mining industry (Fielding, Grant, Hayes, Chaisson, Corbett & Churchyard, 2011).

### ***Silicosis and dust***

The breaking and blasting of rock in mining operations inevitably results in dust, and the depth of South African mines renders dust more difficult both to control and to remove from underground. ‘Indications are that rates of occupational lung disease have risen to the same high levels that were experienced during the early part of the 20th century’ (Guild et al., 2001:122). Silicosis is the most common dust-related disease occurring in South African mining. (TB is caused by a bacterium.) Under present conditions, about one-third of all mineworkers will develop silicosis during their lifetime (Murray, 2011). There appear to have been only insignificant reductions in dust exposures, particularly in gold mining, in the second half of the 20th century (Guild et al., 2001:122). However, dust levels in mines and worker exposure to dust are complicated by many factors. Levels of dust vary between the mines, since they use a range of different ventilation technologies. Dust exposure can also vary within a single mine, at different locations, depths and times, and according to the type of work undertaken. For example, blasting exposes a worker to more dust than operating a cage (lift). Changes in worker contracts and limitations on foreign workers entering South Africa since the 1970s have meant that local mineworkers spend more months each year, and for many more years, being exposed to toxic dust:

Since the mid-1970s, however, the pattern of recruitment to the South African mines has been transformed, with the independence of Mozambique, political intervention in the release of labour from Malawi, and the toll of HIV/AIDS in neighbouring territories. This led the industry, under pressure from the apartheid state, to recruit South Africa's rural unemployed and, in its own interest in establishing a more experienced workforce, to recruit an increasing number of local Africans for longer and longer periods. The average length of a mine contract increased from 4.5 to 13.4 months. ...the mines developed a strategy of ensuring control over skilled miners through a sophisticated callback system. This has meant that the average age of the workforce also increased, an added risk factor in the contraction of occupational lung disease (Marks, 2006:572).

The longer contracts and, more importantly, the longer total time they spent on the mines exposed black miners to conditions that not only greatly increased their chances of reactivating TB infection but also greatly increased their likelihood of contracting silicosis (Packard, 1989:316). The Leon Commission also noted that mine management benefited from opportunities created by the changes in the migratory labour pattern, because a more reliable workforce was able to move away from fragmented work practices to multi-task working. The Commission reported that: 'No convincing evidence was provided to the Commission, however, that similar advantage was taken in the area of health and safety training' (Leon et al., 2004:72). The increased use of South African mineworkers has probably increased the incidence of the disease within the country's borders, rather than displacing it to neighbouring countries where it would simply be forgotten. Silicosis renders workers more vulnerable to other lung diseases, such as TB, chronic bronchitis, pneumonia and emphysema. The disease is especially sinister because, even once exposure ceases, dust particles retained within the lungs continue to be biologically active and the condition continues to develop (Guild et al., 2001:124). Silicosis is incurable, but is *preventable* if mineworkers are able to work in optimal conditions and take all necessary precautions to protect their lungs. Silicosis is therefore a definite priority focus for H&S training.

### ***Noise-induced hearing loss (NIHL)***

Hearing loss is a widespread risk for mineworkers. Research has indicated that the time-weighted average (TWA) exposure of mineworkers to noise, normalized to an eight-hour shift, is generally between 90 and 100 decibels depending on occupation. The legally recognized safe limit is 85 decibels. It is estimated that between 68 and 80 per cent of mineworkers are exposed at a time-weighted average of 85 decibels or greater, indicating a significant risk of hearing loss for the majority of the industry's personnel (Guild et al., 2001:195). The Mine Health and Safety Council (MHSC) has facilitated agreed-upon target milestones for the industry with regard to noise levels and hearing loss, which are due to come into effect between 2008 and 2013 (See later). However, mineworkers have told doctors with extensive experience in mining that they do not wear ear protection because they fear they will not hear the start of rock falls, the mine hazard they fear the most (Baskind, 2008: Personal communication), or that they may develop fungus infections in their ears (Banyini-Mulaudzi, 2011: Personal communication). Such perspectives suggest a role for more insight, rather than compliance-based training.

## **2.8 Small mine sector**

The small mine sector warrants a special section because, though still minor in scale, it is a very fast-growing sector that appears to be especially vulnerable to lapses in health and safety. The sector is not clearly defined and ranges from informal operations, which provide subsistence living (artisanal mining), to the 'junior' companies with high turnover. It is also referred to as the artisanal small mine (ASM) sector. The South African government actively encourages the sector, as it contributes significantly to job creation. It is estimated that about 3 000 jobs can be created for every 15 sustainable small-scale mining projects given assistance (DME website, 2009). The small mine sector employs an estimated 30 000 people, compared to the 500 000 in formal mining (Hoadley & Limpitlaw, 2004:1). There is an unknown number of illegal mining operations in South Africa, many of which operate in the abandoned workings of legal mines. Illegal mining is difficult to monitor and illegal miners, due to a lack of proof, are often only charged with trespassing. Illegal mining is generally not reported to authorities.

Most illegal miners are ex-mine workers with vast experience in mining and often conspire with security and current miners who supply them with explosives (Parliamentary Communication, 2009). There are also connections between small scale ventures and BEE, as observed by Frankel:

...more worrying are the wave of BEE-driven coal-mines which have capitalised on the relatively low costs of setting up shallow coal mines in Limpopo and Mpumalanga. In many of these new operations safety standards are often primitive by any criteria (Frankel, 2010:15).

The scale of accidents in the ASM and illegal sectors are not always included in mine statistics and are only just beginning to be calculated. Fatalities due to mining incidents for the period of June 2008 to June 2009 were 142 deaths of miners lawfully employed and 135 deaths of illegal miners (Shabangu, 2009:n.p.). An illustrative example is provided by the diamond industry, where fatality rates have been increasing since early 2007. According to the Presidential Audit, the statistics from the diamond operations are most probably linked to an influx of new entrants to the diamond industry in the form of alluvial diggers, following the liberalization of the local minerals industry through the introduction of the Minerals and Petroleum Resources Development Act (MPRDA) in 2004 (DME, 2008:21). Generally, health and safety are considered to be compromised by small scale operators due to the following factors:

- Economic considerations: many of the owners use their entire income for daily living and do not invest in equipment;
- Exaggerated safety requirements that discourage them and inspire them to ignore all advice;
- Lack of hazard and risk awareness (*ibid*: 22).

A survey commissioned by the Mine Health and Safety Council (MHSC) reported that if data on accidents in small-scale mining are deficient, they are probably non-existent for occupational health because screening and disease-prevention programmes are rare or non-existent in that sector (Dias, Mudau, Phelane & McGill, 2007:7).

The loose management style and even the willingness to tolerate unsafe practices were important factors which contributed to the poor compliance with safety practices (Dias et al., 2007:8). The most pervasive health hazard in this sector was found to be dust, mainly because of the large number of surface operations and their location in arid regions of the country. Other specific hazards noted were:

<b>Table 7: H&amp;S concerns in the small mine sector</b>	
<b>Health</b>	<b>Safety</b>
Dust	Rock falls/subsidence due to uncertain pillar design
Noise	Misuse of explosives
Exposure to mercury and other chemicals	Equipment obsolete, poorly maintained and inappropriately adapted
Poor or no ventilation (heat, humidity, lack of oxygen)	Lack of personal protective equipment (PPE)
UV radiation due to surface workings	Climbing shafts (up to 90 m deep) using handholds/footholds or rope
Heat exhaustion due to inadequate space and inappropriate equipment	Use of torches attached to helmets in absence of electricity.
No ablutions for hygiene/washing off toxic substances.	

(Source: Dias et al., 2007:4-7)

Most of the recommendations of the survey relate to development of the efficacy of operators or workers:

- To develop guidelines/guidance specifically for the small-scale mine operator that would take into account the special requirements and limited resources of small-scale mines, when compared to those of larger mines;
- To determine training needs and provide training to small-scale mine operators; and
- To have a database of all relevant handbooks on occupational hygiene measurements and the interpretations of these measurements, and have these translated into one or more African languages (ibid: 14).

The very fast-growing small mine sector provides employment for retrenched mineworkers, with encouragement from the South African government. However, the sector falls beneath the radar of formal H&S monitoring.

Efforts to enhance the H&S efficacy of individual mineworkers may have some impact if and when they move into the small mine sector, while other regulations and policy directives do not really reach this sector.

## 2.9 Policy and legislation

### *Mine Health and Safety Act (MHSA)*

South Africa has substantial H&S legislation. The most far-reaching legislation, the Occupational Health and Safety Act (OHSA) 85 of 1993, applies in all contexts except mining, which has its own dedicated legislation. The OHSA is administered by the Department of Labour. In special circumstances, the Minister of Minerals Resources may make specific applications of the OHSA applicable to a mine after consulting with the Mine Health and Safety Council (See Section 80 of the Mine Health and Safety Act). Mines and other mining locations, such as quarries, fall under the auspices of the Mine Health and Safety Act (MHSA) 29 of 1996 and Amendment Acts 72 of 1997 and 74 of 2008, administered by the Department of Minerals Resources.<sup>11</sup> An explanation for the sector-specific legislation follows:

The South African mining industry is characterised to a large degree by the anomaly of huge technological developments accompanied by a largely unskilled or semi-skilled workforce. This combination, apart from the nature of mining itself, increases the scope of occupational hazards significantly enough to merit health and safety legislation distinct from that which governs the rest of South African industry (Joubert, 2007:406).

The MHSA aims to protect employees and other persons at mines and to promote a culture of H&S. It is extensive in its focus and provides not only for the enforcement of measures but also for participation of employees, employers and the state in H&S in the form of representative tripartite institutions (state, industry, labour).

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<sup>11</sup> From this point onwards the Mine Health and Safety Act 29 of 1996 and Amendment Acts 72 of 1997 and 74 of 2008 will collectively be referred to as MHSA.

Tripartite representatives should review legislation, enhance research and effective monitoring systems and promote training and human resource development to improve H&S (Joubert, 2000:265-266). Specific regulations in the Act relate to different mining functions, such as those involving electricity, explosives, machines and transport. The powers, duties and rights of the different stakeholders, from the Minister of Minerals Resources, to employers, chief executive officers (CEOs), managers, inspectors, health and safety representatives, and employees, are also outlined. The sections of the MHSA most relevant to this study are those which relate to training and affect 'every employee', rather than managers or other officials (MHSA, Chapter 2).<sup>12</sup> Education and training in the mining sector are dealt with in detail in Chapter 5. All mineworkers are legally empowered to use their own judgement/self-efficacy when faced with H&S risks and voluntarily to leave a work site that they regard as unsafe or unhealthy (MHSA, Chapter 2, Section 23). An employee has the right to leave the workplace if and when circumstances arise that 'with reasonable justification, appear to that employee to pose a serious danger to the health or safety of that employee'. However, anecdotal reports indicate that workers find it difficult to interpret 'reasonable justification' for walking out and fear losing their employment, or losing good employment, if their reasons for walking out are later found to be invalid.

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**<sup>12</sup> MHSA, Chapter 2, Health and Safety at Mines, Section 22**

Every employee at a mine, while at that mine, must

- a) take reasonable care to protect their own health and safety;
- b) take reasonable care to protect the health and safety of other persons who may be affected by any act or omission of that employee;
- c) use and take proper care of protective clothing, and other health and safety facilities and equipment provided for the protection, health or safety of that employee and other employees;
- d) report promptly to their immediate supervisor any situation which the employee believes presents a risk to the health or safety of that employee or any other person, and with which the employee cannot properly deal;
- e) cooperate with any person to permit compliance with the duties and responsibilities placed on that person in terms of this Act; and
- f) comply with prescribed health and safety measures.

The legislation also requires the election of H&S representatives for internal monitoring; and the deployment of inspectors for external monitoring of compliance with the MHSA. These two systems are discussed below.

### ***Compliance and monitoring***

Two statutory bodies assist the Minister of Minerals Resources in monitoring and enforcing H&S compliance: the Mine Health and Safety Inspectorate (hereafter, 'the Inspectorate') and the Mine Health and Safety Council (MHSC).

The Inspectorate is a section within the Department of Minerals Resources (DMR), under the leadership of the Chief Inspector of Mines. Inspectors operate from regional offices with almost unlimited access to mine property. They are empowered with immediate and far reaching powers and are able to impose fines and to limit or shut down mine operations.<sup>13</sup> However, there is a nation-wide lack of skilled people to do such work in the competitive local labour market, with more attractive remuneration in the private sector. Candidates trained within the Inspectorate soon move on to the private sector (DME, 2008:40-41). The Inspectorate has a vacancy rate of 29%, and a number of these vacancies have been advertised repeatedly without attracting any suitable candidates (*ibid*: 42). The future capacity of the system of inspectors is also not assured: 'It appears that the inspectorate will continue to struggle with recruitment and retention and the subsequent lack of capacity' (*ibid*: 44).

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<sup>13</sup> In the course of their work, inspectors may:

- enter any mine at any time without warrant or notice;
- question any person on any matter;
- examine any relevant document and make a copy of it or take an extract from it;
- inspect arrangements made by the employer for medical surveillance of employees;
- seize any document, article, substance or machinery or any part or sample of it.

An inspector may issue fines, limit or shut down workings on a mine where a person's death, serious injury or illness to a person or a health threatening occurrence has occurred.

(Source: MHSA, Chapter 5, Sections 47-50.)

Other research points to a lack of funding in the Inspectorate from the government: ‘The government was blamed in consequence, because without proper monitoring of the legislative mechanisms, it would be impossible to check if companies were complying with mining safety regulations’ (Eweje, 2005:171).

The Chief Inspector of Mines is also the chairman of the Mine Health and Safety Council (MHSC), a statutory body made up of equal representation of state, employer and organized labour. The primary function of the MHSC is to advise the Minister of Minerals Resources about mine H&S, especially in terms of policy. Three permanent committees of the MHSC focus on research, legislation and monitoring (MHSC, 2009a:4). According to the Minister of Minerals Resources, the mining industry has achieved an overall score of 66% compliance with MHSA (ibid:5). A number of variables were assessed and health risk management was reported to have the lowest score. Compliance scores, averaged across the sector for different commodities and regions, produced the following results:

<b>Table 8: MHSA compliance scores across sector</b>			
<b>Highest %</b>		<b>Lowest %</b>	
Legal appointments	75	Codes of Practice	62
Mine water management	72	Occupational H&S policy	59
Mine design	70	Health risk management	56

(Source: DME, 2009a:n.p.)

### ***Other policy developments***

The MHSC also facilitates consensus towards targets and milestones for mine H&S. At a summit in 2003, tripartite stakeholders (state, employer, labour) agreed to targets with regard to fatalities and injuries and the elimination of silicosis and noise-induced hearing loss. Milestones, or intermediate steps to the targets, are to be attained by the industry over a ten-year period from 2003 to 2013. They are presented in the next table.

**Table 9: Mine H&S milestones**

Target	H&S milestones for 2013
Zero rate of fatalities and injuries	Achieve safety performance levels in line with international standards Ensure continuous improvement
Eliminate Silicosis	Ensure 95% of all exposure measurement results will be below the occupational exposure limit for respirable crystalline silica of 0.1 mg/m <sup>3</sup> by 2008 Ensure no new cases of silicosis occur
Eliminate Noise-Induced Hearing Loss	Ensure that no hearing deterioration greater than 10% occurs amongst occupationally exposed individuals; Ensure the total noise emitted by all equipment installed in any workplace does not exceed a sound pressure level of 110 dB
Prevention of HIV Aids	Ensure that employees receive education on HIV and Aids to ensure that the rate of HIV and Aids is drastically reduced in the mining and minerals sector

(Source: MHSC, 2009a:2)

Current trends in available data indicate that local mining is not achieving the level of improvement needed to reach the milestones (Hermanus, 2007:535; Frankel, 2010:17). Consequently, stakeholders in the sector formulated a Tripartite Action Plan on Health and Safety in 2008, presented below:

**Table 10: Key actions from the 2008 Tripartite Action Plan on Health and Safety**

Strategic goal	Action
Strengthen the culture of H&S	<ul style="list-style-type: none"> <li>Implement a culture transformation framework</li> </ul>
Promote learning from best practice	<ul style="list-style-type: none"> <li>Establish a MOSH learning hub to promote the adoption of leading practices</li> </ul>
Build capacity in H&S	<ul style="list-style-type: none"> <li>Train 40000 H&amp;S representatives and union shop stewards</li> <li>Develop a strategy to train and retain OHS professionals</li> </ul>
Improve R&D	<ul style="list-style-type: none"> <li>Establish a centre of excellence of mine H&amp;S</li> </ul>

(Source: COM, 2010a:129)

It is not clear why the targets set are not being reached. Perhaps they were too ambitious, or possibly the methods, systems and technology required for the necessary changes were and are not in place. Frankel (2010) suggests that ‘worker engagement’ with H&S would be a more functional goal:

This is perhaps a far more important milestone to reach than the zero-harm identified for 2013 by the industry. Indeed, as evidence shows irrevocably, zero-harm cannot be achieved, least of all maintained, unless it is preceded by employers moving beyond mere conversation to genuine mutual involvement with their employees. This involves, at baseline, equipping labour with self-efficacy based on meaningful work (Frankel, 2010:32).

Much is made of partnerships for health and safety in the mining industry, and there are numerous summits involving the state, industry and the trade unions. Such stakeholder partnerships and agreements are integral to policy development in the new South Africa. They appear to have the advantages of being inclusive, providing a range of ideas and comprehensive logistical support for initiatives, creating a form of ‘new governance’:

The new governance: An increasing reliance on multi-stakeholder initiatives, networks, or partnerships for the purpose of policy-making and/or implementation. Hence, new governance has often been defined as the shift of policy- and decision-making power and responsibility from the state towards more dispersed, collaborative networks of social actors (Hamann, Khagram & Rohan, 2008:22).

However, the primary reliance on stakeholder consultation for policy development and planning of education and development programmes is questioned in terms of realism and the utility of the policy produced, as opposed to simple endorsement (Jansen, 2002:207; Campbell, 2003:181; Hamman et al., 2008:23). The dispersal of vision and responsibility and the unequal power of different stakeholders, in reality as opposed to the ideal, are raised as cautions. In fact, the different mining stakeholder representatives, especially those representing industry and providers of training, are often intense competitors in the market place. The H&S record of large companies has some influence on foreign investment in individual companies. Even once goals are agreed upon, there may still be inadequate conceptualization of how to achieve them. Nor is there always systematic accountability among the different partners. This is not necessarily the case in the H&S goals set, but it is an issue to consider in the formulation of future policy and initiatives.

### ***Health and safety representatives***

Health and safety support for workers, ongoing and on-site, is ideally offered by health and safety representatives. Every mine with 20 or more employees is compelled to have an H&S representative, elected by workers, for each shift at each designated working place in the mine.<sup>14</sup> In principle, the H&S representative system is a positive intervention, because it has extensive reach across the sector and provides direct connections to the most vulnerable workers, but the system is still unfolding and representatives may still lack power and credibility in the workplace, as is evidenced in the following quote from the biggest trade union operating in the sector:

The Mine Health and Safety Act, among other important rights, entrenches the right to refuse dangerous work. The Act also formalises the election of health and safety representatives by workers to participate in health and safety committees. But these representatives are unable to exercise these rights: their opinions are overlooked and they have no influence in exercising discretion on the danger of mining terrains (Baleni, 2007:2).

### ***Compensation***

The legislation governing compensation is not overtly designed to influence health and safety behaviour in mines. However, many critiques of the existing legislation declare that it places limited financial pressure on employers to ensure the H&S of workers and contributes to its low priority.

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<sup>14</sup> Representatives may not be responsible for more than 100 workers in a single workplace or more than 50 workers if the designated workplace includes separate working places. The representative must be employed in a full-time capacity in the designated working place. A few of the stated functions and tasks of H&S representatives are listed below:

- Represent employees on all aspects of health and safety;
- Identify potential hazards and risks to health or safety;
- Inspect working places with regard to the health and safety of employees at intervals agreed with the employer;
- Make representations or recommendations to the employer or to a health and safety committee on any matter affecting the health or safety of employees;
- Direct any employee to leave any working place whenever circumstances arise that with reasonable justification appear to pose a serious danger to the health or safety of that employee

(MHSA, Chapter 3, Sections 25-30).

The nature and functioning of local compensation legislation, especially the Occupational Diseases in Mines and Works Act of 1973 and the Amendment Act 60 of 2002 (ODMWA), have been found to displace the burden of disease onto rural communities when sick mineworkers return home after receiving the one-off payments required in terms of the Act:

No investigation of the equity of the ODMWA compensation system has been done before. It is posited that it is a discriminatory system that is a cheap form of compensation which serves as a subsidy to the mining industry in that it externalizes the costs of occupationally acquired lung disease. The labour sending communities which provide large numbers of migrant mineworkers to the mining industry are likely to have a high prevalence of silicosis and silico-tuberculosis which would have a severe social impact, intensifying deprivation and poverty amongst former mineworkers and their families, as well as within their communities (Roberts, 2009:12).

This view explains structural lapses in health and safety in the workplace; however, this is a topic for another thesis. The legislation is outlined briefly here, with regard to how it may be referred to in this study. Two statutes regulate the compensation of workers for workplace injuries and occupational diseases. The Compensation for Occupational Diseases Act 130 of 1993 (COIDA), administered by the Department of Labour, provides for payment of medical treatment, periodical payment for workers with a temporary disability, and lump-sum or pension payments to permanently disabled workers. The ODMWA is administered by the Department of Health and compensates workers in mines and works for respiratory diseases. Financial benefits under ODMWA are limited to lump-sum cash benefits. The existence of a separate compensation system can be traced to legislation regulating lung diseases in the early years of the mining industry. A decision to merge the two compensation systems was made in 1996, but has not yet been implemented.

## 2.10 Conclusions

This overview of mine health and safety in South Africa suggests a policy-practice divide. The legislation is comprehensive, but implementation and compliance are limited. Mine health and safety statistics, reports and anecdotal evidence reveal a comparatively poor safety record and a dire health situation, considered in the light of the extensive legislation. Aspects of the legislation, which should affect underground workers directly, such as training (see later), the representative system and the inspectorate are still developing or lack capacity. The reasons for poor achievement are many and complex. Mine H&S policy development may have been subject to the same constraints as other stakeholder-defined policy processes in South Africa - a lack of accountability between 'equal' stakeholders and a dispersal of vision and responsibility. Mine safety is improving over the long term in the formal mining sector, and the MHSA is valuable in providing a sound policy and legal framework for standards, surveillance and initiating changes. However, it is virtually impossible to monitor compliance in a sustained way in a tunnel that is one metre wide and four km underground. (Narrow tunnels are less likely to collapse than those that are wider.)

H&S may be more assured by focusing on those whose efficacy is essential to their safety - underground workers at the end of the chain of command who comprise about 73% of the total mining workforce. The acknowledged neglect of occupational health in the context of terrible occupational disease (and increasing lung disease) suggests an urgent priority for H&S policy, practice and training. Adherence to and compliance with standards may be acknowledged by large employers operating within South Africa. However, the increasing number of small mines and contract workers suggests that an increasing number of mineworkers will fall outside of safety networks and surveillance. New policy and practice developments may be required.

## CHAPTER 3

# UNDERSTANDING SELF-EFFICACY

### 3.1 Introduction

#### *Scope of the chapter*

This chapter aims to explore the concept of self-efficacy in order to apply it to H&S programmes for local mineworkers, especially those who are classified as unskilled and semi-skilled. It also begins to address the first research question of this study:

*How can the concept of self-efficacy be applied to workplace H&S programmes for unskilled and semi-skilled workers in South Africa?* This is done by investigating and analysing the concept. Much research and analysis have taken place as notions of self-efficacy have evolved over the past 50 years, and it would be possible to do an entire thesis on the subject. This chapter charts the main developments, the most essential and enduring features and applications of self-efficacy, in order to understand and use the concept in an informed way. The task is undertaken in the form of a review of the established literature. Three main criteria were used to select sources:

- the prominence of the author within the wide body of literature on self-efficacy;
- whether the issue under discussion related to the topic of this study, e.g. the use of self-efficacy in the context of a rapidly developing country;
- the quality of engagement and deliberation within a particular source.

### ***Introducing the concept***

I found the term ‘self-efficacy’ used in many different types of sources, with apparent semantic consistency but varying degrees of depth and thoughtfulness. The applications of the self-efficacy concept are numerous and varied and the term self-efficacy is widely used without interrogation of the original concept. A common understanding of the essential meaning of self-efficacy as ‘the belief in one’s effectiveness in performing specific tasks’ (EduTech Wiki, downloaded 17 March 2008). Such self-efficacy beliefs are inevitably founded upon a number of complex and interacting elements, to be discussed in this chapter. A single, predominant definition was not evident in the literature. The following explanations indicate some of the complexity and calibration of the concept and form a reasonable starting point:

Perceived self-efficacy is defined as people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave (Bandura, 1994:n.p.).

A person with positive self-efficacy expects to succeed and will persevere in an activity until the task is completed. A person with low perception of self-efficacy anticipates failure and is less likely to attempt or persist in challenging activities (Kear, 2000:4).

Albert Bandura, a social psychologist, is undoubtedly the most eminent author on the subject and has been published consistently for nearly 50 years. However, many other writers have taken up and applied his ideas. The great number of references available suggests that self-efficacy developed from a fresh idea in the 1960s to an established and influential concept, now supported by a substantial body of literature.

### 3.2 Development of the concept

#### *Origins of self-efficacy*

A concept analysis of self-efficacy found that, although Bandura dominates writing about self-efficacy, it was first mentioned in psychological theories of motivation in the 1950s (Kear, 2000:1). Robert White (1959) introduced the notion that certain actions and outcomes are not motivated by animal instincts or drives, but by a ‘feeling of efficacy’ or satisfaction resulting from a successful interaction with the environment. The concept did not appear to find favour again until nearly 20 years later, when it became the construct that formed the basis for Bandura’s social learning theory of behaviour change (Bandura, 1977a; Kear, 2000:2). Bandura later altered the label of his theory from ‘social learning’ to ‘social cognitive theory’, in order to distance it from the prevalent social learning theories of the day and to emphasize the critical role of cognition in people’s capability to construct reality, self-regulate, encode information and direct behaviour (Pajares, 2002:1). The concept emerged from an intense engagement with theories of learning and behaviour change, as well as through empirical testing (See later).<sup>15</sup> This descriptive summation aims to establish the academic origins and credentials of self-efficacy.

In the initial stages of his work, Bandura was primarily interested in behaviour change as it related to psychotherapy or psychosocial change for therapeutic purposes. Over time, the scope of his work broadened. Bandura identifies frustration and dissatisfaction with the dominant theories of learning and behaviour change of the times as early influences. In different sources, he expresses misgivings with the Psychodynamic and Behaviourist approaches of the 1950s and 1960s (Bandura, 2004; Bandura, 2005). Concerns with the Psychodynamic approach to personal change were related to what he termed its ‘psychic determinism’ and ‘benign neglect of environmental influences’ (Bandura, 2004:614). ‘Behaviour was said to be regulated by an inner psychic life of animated impulses and complexes operating below the level of consciousness and disguised by defensive mental operations’ (*ibid*).

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<sup>15</sup> As stated in Chapter 1, self-efficacy is referred to in different ways in different sources. This thesis refers to self-efficacy as a concept.

Psychodynamic approaches had adopted a ‘quasi-disease model of deviant behaviour’, in which unconventional behaviour was labelled as symptomatic of psychic pathology (*ibid*). However, behaviourism also had limitations:

Behaviorism was very much in vogue at the time I began my career. The process of learning occupied the central position in this form of theorizing. The prevailing analyses of learning focused almost entirely on learning through the effects of one's actions. The explanatory mechanisms were cast in terms of establishing connections between stimuli and responses at the peripheral level through reward and punishment consequences. The behavioristic theorizing was discordant with the evident social reality that much of what we learn is through the power of social modeling (Bandura, 2005:10).

It is not within the scope of this chapter to critique these two approaches nor to consider the validity of Bandura’s criticisms, but to identify them as contextual tensions that led to the conceptualization of self-efficacy. Overall, Bandura suggests that existing approaches to behaviour and behaviour change were largely explanatory, lacking in predictive and therapeutic power, and that the time was ripe for a new conceptualization (Bandura, 2004: 614). ‘Discontent with the adequacy of existing theoretical explanations provides the impetus to search for conceptual schemes that can offer better explanations and solutions to phenomena of import’ (Bandura, 2005: 10).

### ***Social modelling and vicarious learning***

The ability and tendency of individuals to learn and modify their behaviour as a result of vicarious experience and social modelling, rather than direct experience, was a primary research and development (R&D) focus in Bandura’s early work. The sources consulted appear to use the terms ‘vicarious learning’, ‘social learning’ and ‘modelling’ interchangeably to refer to learning that takes place vicariously, through observation or through social engagement, without direct reward or punishment. The power of social modelling to influence behaviour, especially the effects of media and peer groups, is rarely disputed today. Yet only 45 years ago, Bandura and his colleagues had to present substantial arguments and evidence to gain acceptance for a position that sounds like accepted wisdom today:

I found it difficult to imagine a culture in which its language, mores, familial customs and practices, occupational competencies, and educational, religious, and political practices were gradually shaped in each new member by rewarding and punishing consequences of their trial-and-error performances (Bandura, 2005:10).

The work of Miller and Dollard (1941) is also identified as a significant early influence on Bandura's work (Bandura, 2004; Bandura, 2005; Pajares, 2002). In spite of the obvious pervasiveness of social modelling in everyday life, there was no research to speak of on modelling processes, except the publication of *Social Learning and Imitation* by Miller and Dollard in 1941 (Bandura, 2005:11). Although they recognized modelling phenomena, these were 'construed as a special case of discrimination learning, a variation of socially endorsed mimicry' (ibid). Bandura and his team launched a programme of research, which continued throughout the 1960s and 1970s, to investigate social and observational learning as it 'typically occurs in the absence of reinforced performance' (ibid). Over the next 10 years their research demonstrated that:

- Observational learning requires neither response enactment nor direct reinforcement.
- Observational learning could lead to generalized imitation, but the process is governed by social beliefs and outcome expectations, rather than by infused reinforcement.
- Human cognition and human action cannot be viewed separately, as theorists had done in the past. Cognitive representations can serve as guides for the production of skilled performances and as standards for making corrective adjustments in the development of behavioural proficiency (Bandura, 2005: 11-12).

By the 1960s, Bandura and his research team were quite confident in publishing both research findings and theories of social learning. Bandura and Walters (1963) published a book, *Social Learning and Personality Development*, which asserted that both learning and its reinforcement could take place vicariously or through observation (Pajares, 2002:1).

However, as Bandura states,

...the value of a psychological theory is judged not only by its explanatory and predictive power, but also ultimately by its operative power to promote changes in human functioning...There were a number of entrenched misconceptions about the nature and scope of modeling that put a damper on the research and social applications of this powerful mode of learning (Bandura, 2005:13).

It is ironic that, as Bandura's ideas about social modelling and vicarious learning became more widely accepted, misconceptions about these ideas became more entrenched, affecting their functional uptake and utility. The main misconceptions to be challenged related to *mimicry*, *creativity*, *selection* and the apparent *limited cognitive* applications of vicarious learning. Bandura conducted and published research that specifically challenged these four misconceptions. Firstly, he demonstrated that learning in the form of modelling was not limited to *mimicry* or simple imitation (Bandura, 1986; Bandura, 2005):

Social modelling involved abstracting the information conveyed by a specific exemplar about the structure and the underlying principles governing the behavior, rather than simple response mimicry of specific exemplars. Once individuals learn the guiding principle, they can use it to generate new versions of the behavior that go beyond what they have seen or heard (Bandura, 2005:13).

Learning through modelling was also held to be antithetical to *creativity*. However, research conducted by Bandura, Ross and Ross (1963) revealed that exposure to different models encouraged selectivity and could possibly aid creativity of individuals. Selectivity was found to be highly individual and subject to differentials. When exposed to different models, individuals not only show discernment between models but adopt advantageous elements, improve upon them, synthesize them into new forms, and tailor them to their particular circumstances (Bandura, 2005:13-14).

When exposed to models who differ in their styles of thinking and behavior, observers rarely pattern their behavior exclusively after a single source. Nor do they adopt all the attributes even of preferred models. Rather, observers combine various features of different models into new amalgams that differ from the individual modeled sources. Thus, two observers can construct new forms of behavior entirely through modeling that differ from each other by selectively blending different features from the variant models (Bandura, 2005:14).

Vicarious learning and modelling were also not limited in their applications to simple learned actions. ‘Critics argued that modeling cannot build *cognitive* skills because thought processes are covert and are not adequately reflected in modelled actions, which are the end-products of the cognitive operations’ (Bandura 2005:14). This criticism was largely dealt with in experiments involving verbal modelling. Meichenbaum (1984) showed that cognitive skills can be promoted by verbal modelling in which models verbalize aloud their reasoning strategies as they engage in problem-solving activities. The model verbalizes and shares thought processes, such as evaluating the problem, seeking relevant information, generating alternative solutions, weighing likely outcomes associated with each alternative, selecting the best way of implementing the chosen solution, evolving strategies for handling difficulties and recovering from errors, and developing self-motivation (Bandura, 2005:14). The strategies referred to above sound rather like study skills mentoring today, but perhaps this is simply an indication of how far modelling has been integrated into modern instruction techniques.

### ***Symbolic and para-social learning***

Bandura’s achievements in demonstrating the power and cognitive reach of observational learning took place at a time which saw massive developments in telecommunications and the electronic media. Bandura soon became aware of the potential scope of this new source of social learning. He extended his notion of social learning and modelling to accommodate these new modes with the idea of ‘symbolic modelling’:

A growing influential source of social learning is the varied and pervasive symbolic modeling through the electronic media. A major advantage of symbolic modeling is that it can transmit information of virtually limitless variety to vast populations simultaneously in widely dispersed locales... Socio-cognitive influences instruct people in new ideas and practices and motivate them to adopt them (Bandura, 2005:14-15).

Put more simply, popular media, drama in particular, afford audiences the opportunity to model and adopt new behaviour through emotional engagement, identification with characters, mental rehearsal and vicarious reinforcement. This phenomenon, known as ‘para-social interaction’, has audiences adopting and relating to characters as real people with whom they identify or whom they aspire to imitate (Bandura, 1977b). In my own reading and AET experience, social learning, whether through electronic or more traditional modes, appears to be an aspect of self-efficacy that has had extremely widespread applications in education for transformation programmes. Miguel Sabido (1981) in Mexico was one of the first people to integrate Bandura’s concept of social learning into a long-running television drama in order to address social issues, literacy and family planning (Bandura, 2005:15). Since then, radio and television soap operas, such as for example Soul City in South Africa, have been used all over the developing world. Multi-media learning could be regarded as an approach to learning. However with reference to mine H&S, it may be more effectively construed as a valuable modality in the context of widespread under-education of workers in the sector.

### ***Reciprocal determinism***

The 1960s were a time of dramatic social upheaval and soul-searching. It is not surprising, therefore, that approaches, explanations and therapies relating to human behaviour were also subject to remarkable transformative changes. Modes of treatment were altered in their content, locus and agents of change (Bandura, 2004:616):

Troublesome behavior was viewed as divergent rather than diseased behavior. Functional analysis of human behavior replaced diagnostic labeling that categorized people into psychopathologic types with stigmatizing consequences... Guided mastery experiences were used to equip people with the competencies, enabling beliefs, and social resources needed to improve the quality of their lives. Efforts were directed not only at enhancing personal capabilities, but also at changing social practices that contribute to behavior problems. With regard to the locus of change, treatments were typically carried out in the natural settings in which the problems arise so as to enhance the development, generalization, and maintenance of new modes of behavior (ibid).

The boundaries between different schools of thought started eroding, and, as Bandura had always asserted, human functioning was finally viewed as the product of the 'dynamic interplay between personal, behavioral, and environmental influences' (Pajares, 2002:2; Bandura 2004:616). This interaction between different domains of human experience is the foundation of Bandura's conception of *reciprocal determinism*. Reciprocal determinism is interaction between:

- (a) personal factors in the form of cognition, affect, and biological events,
- (b) behaviour, and
- (c) environmental influences.

He also describes this interaction as *triadic reciprocity*. Acquired behaviour is thus motivated and regulated by the complex interplay of contextual, incentive and self-regulatory influences (Bandura, 2004:614). Bandura proposed a construct relating to 'behaviour change' which acknowledged the reciprocal nature of the determinants of human functioning. This sounds reasonable today, but at the time it differed from existing change theories that had been concerned with only biological, internal psychological or environmental factors (Pajares, 2002:2). Reciprocal determinism offered a wide-open opportunistic base for therapeutic interventions:

Social cognitive theory makes it possible for therapeutic and counseling efforts to be directed at personal, environmental, or behavioral factors. Strategies for increasing well-being can be aimed at improving emotional, cognitive, or motivational processes, increasing behavioral competencies, or altering the social conditions under which people live and work (Pajares, 2002:2).

### ***The Agentic view***

Having gained ground in terms of social learning and acceptance of the view that human behaviour is influenced by various reciprocal determinants, Bandura turned his attention to human volition. He was committed to an *agentic* view of human behaviour, i.e. that behaviour is subject to intentional, cognitive or agentic influences, rather than unconscious internal impulses or external reward and punishment stimuli. Again, he encountered resistance. ‘This was not a hospitable time to present an agentic theory of human behavior. Psychodynamicists depicted behavior as driven unconsciously by impulses and complexes. Behaviorists depicted behavior as shaped and shepherded by environmental forces’ (Bandura, 2005:20). The Behaviourist view seemed to be especially in conflict with Bandura’s own vision of human nature.

In this conception, motivation was regulated by a crude functionalism grounded in rewarding and punishing consequences. This approach presented a truncated image of human nature given the self-regulatory capabilities of people to affect their thought processes, motivation, affective states, and actions through self-directed influence (*ibid*: 16).

Even new technological developments and images were unhelpful:

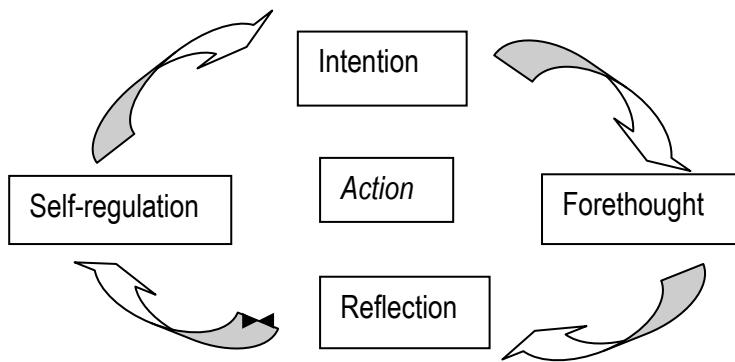
The cognitive revolution was ushered in on a computer metaphor. This conception stripped humans of agentic capabilities, a functional consciousness, and a self-identity. The mind as a symbol manipulator in the likeness of a linear computer became the conceptual model for the times. It was not individuals, but their sub-personal parts that were orchestrating activities nonconsciously. Control theories of motivation and self-regulation focused heavily on error correction driven by negative feedback loops in a machine metaphor of human functioning (*ibid*: 20).

In terms of Bandura's conception, to be a *sentient agent* is intentionally to influence one's functioning, life circumstances and environmental conditions and make things happen by one's actions (Bandura, 2004:618 and 2001:2). In this view, people are contributors to their life circumstances, not just products of them. People are viewed as self-organizing, proactive, self-reflecting and self-regulating, rather than as reactive organisms shaped and shepherded by environmental forces or driven by concealed inner impulses (Pajares, 2002:2). In a series of studies, Bandura demonstrated that people are aspiring and proactive organisms, not just reactive ones. Their capacity to exercise forethought enables them to wield anticipatory control, rather than being simply reactive to the effects of their efforts. They are motivated and guided by foresight of goals, hindsight of shortfalls, as well as by anticipatory notions about their own success.

### ***Self-regulation***

Bandura asserted that human motivation involves numerous variables and that many of these in turn involve cognition, rather than responses to physical or environmental stimuli. Human agency or motivation includes *intention*, *forethought*, *reflection* and *self-regulation* (Bandura, 2004:618). These core features constitute a cycle of adjustments that people make as they learn and develop, achieve and adjust personal goals.

**Table 11: Self-regulation in self-efficacy**



(Source: Adapted from Bandura, 2004:618)

Bandura demonstrated that people motivate and guide themselves proactively by setting themselves challenging goals and performance standards that create negative discrepancies to be mastered (intention). They then mobilize their effort and personal resources, on the basis of their estimation of what it will take to fulfil those standards (forethought). Reactive feedback control comes into play in the subsequent adjustments of effort in order to achieve the desired outcomes (reflection). After people attain the goals they have been pursuing, those of high perceived efficacy set a higher standard for themselves (self-regulation) (Bandura, 2005:21). Over time, the terminology changed slightly to:

Intentionality  $\Rightarrow$  Forethought  $\Rightarrow$  Self-reactiveness  $\Rightarrow$  Self-reflectiveness

Bandura concurs that human transactions involve ‘situational inducements’, but holds that they are also governed by what he terms self-evaluative outcomes, which may override the influence of external outcomes (Bandura, 2001:8). These self-evaluative outcomes extend into cognitive, psycho-social and moral domains.

People do things that give them satisfaction and a sense of self-worth, and refrain from actions that will bring self-censure... They are self-examiners of their own functioning. They reflect on their efficacy, the soundness of their thoughts and actions, the meaning of their pursuits, and make adjustments if necessary (Bandura, 2004:618).

While this sounds much like accepted wisdom today, ‘vigorous battles were fought’ over these cognitive determinants of motivation and their scientific legitimacy. Bandura’s work on self-regulating components of motivation did not fit within the traditional scientific paradigm of study. They were difficult to relate to specific observable events and could not explain the functional relations between such events. Bandura’s response was to employ a multi-disciplinary task team to enhance the status of his offerings (Bandura, 2004:618-619). Self-reactiveness and self-reflectiveness proved to be the most complex aspects of motivation, and Bandura made a clear distinction between them.

*Self-reactiveness:*

Self-reactiveness involves the ability to make choices regarding action plans, give shape to appropriate courses of action and to motivate and regulate their execution. ... Monitoring one's pattern of behavior and the cognitive and environmental conditions under which it occurs is the first step toward doing something to affect it. Actions give rise to self-reactive influence through performance comparison with personal goals and standards (Bandura, 2001:8).

(Self-reflectiveness as a deeper, more value-driven process is discussed later.)

Self-reactiveness is further governed by personal goals, standards, moral agency and assessment of performance. ‘Actions give rise to self-reactive influence through performance comparison with personal goals and standards. Goals, rooted in a value system and a sense of personal identity, invest activities with meaning and purpose’ (Bandura, 2001:8). The observations regarding goals relate primarily to personal agency, but have wider applications. Vast amounts of time and resources are spent setting both individual and collective goals in modern strategic thinking, for example, the 2013 mine H&S milestones referred to in Chapter 2. With reference to goals and the motivation to act, Bandura concludes that: ’Goals do not automatically activate the self influences that govern motivation and action. Evaluative self-engagement through goal setting is affected by the characteristics of goals, namely, their specificity, level of challenge and temporal proximity’ (*ibid*). Bandura’s analysis of goals in facilitating change may be applicable to aspects of the current H&S system in mining.

As seen in Chapter 2, the setting of goals and targets is a major concern, and compliance with guidelines and standards is an elemental aspect of the system.

General goals are too indefinite and non-committing to serve as guides and incentives. ...The self-regulative effectiveness of goals depends greatly on how far into the future they are projected. Proximal subgoals mobilize self-influences and direct what one does in the here and now. Distal goals alone set the general course of pursuits but are too far removed in time to provide effective incentives and guides for present action, given inviting competing activities at hand. Progress toward valued futures is best achieved by hierarchically structured goal systems combining distal aspirations with proximal self-guidance (*ibid*).

Bandura found that *moral agency*, like other aspects of self-reactiveness, operates in different motivational forms, both inhibitive and proactive. The power to refrain from ‘bad’ or inhuman behaviour is the inhibitive form, while the proactive form motivates people to act humanely (Bandura, 2001:9). After people adopt a standard of morality, their personal standards serve as the regulatory self-influences: Positive experiences are induced when people do things that give them self-satisfaction and a sense of self-worth. Logically, they also refrain from behaving in ways that violate their moral standards, because these will bring negative experiences such as self-disapproval (Bandura, 2005:21-22). However, moral agency does not function as a fixed regulator of behaviour, but is only enlisted in certain activities. Bandura found that there are many ‘psychosocial manoeuvres’ by which moral self-reactions can be selectively disengaged from inhumane conduct (Bandura, 2001:9). Certain mechanisms reduce the sense of personal agency through *diffusion and displacement* of responsibility away from the self. Moral self-sanctions are also weakened or disengaged at the *outcome locus* of the process when one ignores, minimizes, or disputes the injurious effects of one’s conduct, or dehumanizes the victims, attributing bestial qualities to them and blaming them for bringing the suffering on themselves (*ibid*). Moral disengagement that centres on the *cognitive reconstruction* of the conduct itself makes harmful conduct personally and socially acceptable; it does so by portraying it as serving socially worthy or moral purposes, masking it in sanitizing euphemistic language or comparing it with worse inhumanities.

Analyses of moral agency show that selective moral disengagement operates at a social systems level and not just individually (Bandura, 2005:22). This is very much in accordance with modern experiences of peer pressure, group mentality and even mob actions.

*Self-reflectiveness:*

Self-reflectiveness was conceived as distinct from self-reactiveness, because it involves the *metacognitive* capability to reflect upon oneself and the adequacy of one's thoughts and actions, rather than merely direct them (Bandura, 2001:10). For Bandura, self-reflection is the capability that is most 'distinctly human'. Hence it is a prominent feature of self-efficacy. Through self-reflection, people make sense of their experiences, explore their own cognitions and self-beliefs, engage in self-evaluation and alter their thinking and behavior accordingly (Bandura, 1986; Pajares, 2002:4).

Over time and in different sources, the two functions, self-reactiveness and self-reflectiveness, are referred to singly as self-regulation, self-evaluation, or self-regulatory capability (Bandura, 2005; Pajares, 2002). It was with the formulation of metacognitive, self-regulatory capabilities within motivation that Bandura's concept of self-efficacy began to take shape. Self-regulatory capability leads people to evaluate their values, the meaning of their life pursuits and their motivation, address conflicts in motivational inducements, and choose to act in favour of one over another. Bandura also realized that within this metacognitive activity, people judge the correctness of their predictive and operative thinking against the outcomes of their actions, i.e. their efficacy expectations and beliefs (Bandura, 2001:8-10).

### **3.3 Consolidating self-efficacy**

*Perception of efficacy*

Previous theorists had conceived motivation in terms of two main dimensions, a response (behaviour) and an estimate that a given behaviour will lead to a certain outcome (outcome expectation). Bandura postulated a more complex view, in which actions are not only governed by outcome expectations but also by efficacy expectations. Individuals may believe that a course of action will produce certain

outcomes (outcome expectations), but if they entertain serious doubts about whether they can perform the necessary activities, such information will not motivate action. In this conceptual system, expectations of personal mastery (efficacy expectations) affect both initiation and persistence of behaviour. ‘The strength of people's convictions in their own effectiveness is likely to affect whether they will even try to cope with given situations’ (Bandura, 1977a:193).

Efficacy beliefs are the foundation of human agency. Unless people believe they can produce desired results and forestall detrimental ones by their actions, they have little incentive to act or to persevere in the face of difficulties. Whatever other factors may operate as guides and motivators, they are rooted in the core belief that one has the power to produce effects by one's actions (Bandura, 2001:10).

Bandura’s theorisation concerning the impact of belief in human functioning began to advance, i.e. that people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true (Pajares, 2002:5). ‘Perceptions and beliefs regarding efficacy ‘determine what individuals do with the knowledge and skills they have’; and helps to explain why people's performance and success are ‘sometimes disjoined from their actual capabilities and why their behavior may differ widely even when they have similar knowledge and skills’ (ibid).

A major question in any theory of cognitive regulation of motivation, affect, and action concerns the issue of causality. A variety of experimental strategies were used to verify that beliefs of personal efficacy function as determinants of actions rather secondary reflections of them (Bandura, 2005:25-26).

During the 1970s, the validation of the effect of belief or perception on efficacy led Bandura to start using the term *perceived self-efficacy*, which is defined as ‘A belief in one’s capabilities to organize and execute the course of action required to attain a goal’ (Kear, 2000:2). Research revealed that ‘Discrepancies between efficacy expectations and performance are most likely to arise under conditions in which situational and task factors are ambiguous’ (Bandura, 1977a:203). This is further explained in the extract below:

Theorizing and experimentation on learned helplessness might well consider the conceptual distinction between efficacy and outcome expectations. People can give up trying because they lack a sense of efficacy in achieving a required behaviour, or they may be assured of their capabilities but give up because they expect their behaviour to have no effect on an unresponsive environment or to be consistently punished. These two separable expectancy sources of futility have quite different antecedents and remedial implications (Bandura, 1977a:204-205).

South African mineworkers could experience comparable ambiguities, especially when H&S competes with the pursuit of production bonuses. Addressing such situations, described as ones of ‘futility’ by Bandura, may require the development of competencies and expectations of personal effectiveness (efficacy expectation), or changing the prevailing environmental contingencies in order for actions to have an impact on the environment (outcome expectation), depending on the weaknesses within the context (Bandura, 1977a:205). The most important point is that training interventions require deep understandings of underlying problems in the contexts in which they are carried out. By the late 1970s, the self-efficacy concept had gained increasing attention and acceptance. In her concept analysis of self-efficacy, Kear observes that from the 1970s to 1990s, many writers discussed definitions and attributes of self-efficacy, but Bandura has remained confidently committed to the concept, which has logical and semantic appeal: ‘People who regard themselves as highly efficacious act, think, and feel differently from those who perceive themselves as ineffectual. They produce their own future, rather than simply foretell it’ (Bandura, 1986:395). With both the growing acceptance of the concept and a vision of its potential, Bandura and his team intensified their theorizing. The consequent development, social cognitive theory, has always been underpinned by self-efficacy beliefs (or perceived self-efficacy), but encompasses extended notions of social and symbolic learning, cognitive aspects of motivation, self-regulation more specific contextual adaptations.

However, self-efficacy is still used in its own right in many sources and has not been subsumed by the wider social cognitive theory. Bandura mounted a multifaceted programme of research to develop his theory and gain a deeper understanding of the nature and function of self-efficacy, including the origins of efficacy beliefs, their structure and function, their diverse effects, the processes through which they produce these effects, and the modes of influence by which such beliefs can be created and strengthened for personal and social change. Applications of social cognitive theory were researched in education, health promotion, disease prevention, clinical dysfunctions such as anxiety disorders, depression, eating disorders, and substance abuse, as well as in personal and team athletic attainments, organizational functioning, and social and political systems (Bandura 2005:25). This is where Bandura's work becomes especially useful for education and training practitioners, because he claims that people's beliefs about their efficacy can be modified and developed.

### ***Context and task specificity***

Certain core features of self-efficacy have endured in the writing of Bandura and others over time and space. As stated earlier, the term self-efficacy is used loosely and widely in education, training and development literature, usually with a comment about the low self-efficacy of workers, learners, students, patients, citizens, etc. In terms of the established literature, such generalized comments constitute an inaccurate use of the concept, since self-efficacy is usually task- and context-bound. A person may have low self-efficacy in one aspect of his or her life, but high self-efficacy in others. Migrant mineworkers may appear to have low H&S efficacy underground, due to a lack of specific training, control or competing interests, yet the same workers manage highly complex logistical and communication arrangements with their distant families. Self-efficacy is a self-assessment of the competence to perform a specific task within a certain context, or a judgement of the ability to perform a desired activity (Pajares, 1997:20; Bandura, 1986; Kear, 2000:3). It is inevitable that people will bring to a situation or performance powerful pre-existing notions of their capabilities, but no amount of confidence or self-appreciation can produce success when the requisite skills and knowledge are absent (Pajares, 2002:5). Self-efficacy beliefs may be critical determinants of how well knowledge and skill are acquired in the first place. 'Self-efficacy beliefs form a potent affective, evaluative and episodic filter, through which new phenomena are interpreted' (*ibid*).

When individuals are familiar with task demands, they may call on the task-specific self-efficacy beliefs that closely correspond to the required performance. When task demands are unfamiliar, people must generalize from prior attainments that are perceived as similar to the required task and gauge their perceived competence with self-beliefs they judge more closely correspond to the novel requirements. To account for this, researchers have drawn a distinction between self-efficacy for performance and self-efficacy for learning (Pajares, 1997:26).

### ***Sources of self-efficacy***

After more than 20 years of research in different contexts, many sources of and influences on self-efficacy have been identified, some of which may be context-specific and some of ‘comprehensive generality’. As Bandura states:

The goal in theory building is to identify a small number of explanatory principles that can account for a wide range of phenomena. In the interest of comprehensive generality, social cognitive theory focuses on integrative principles that operate across differing spheres of functioning (Bandura, 2005:25).

Six main sources of self-efficacy are generally discussed in the literature (Bandura, 1994, n.p.; Bandura, 1997:5517; Bandura, 1998:54-55; Bandura, 2004, 620-624):

- self-concept
- mastery
- vicarious, social or para-social learning
- social or verbal persuasion,
- somatic or emotional states, reducing stress reactions
- locus of control

More recently Bandura has suggested that self-efficacy is more complex and less subject to generic definition:

Efficacy beliefs differ in generality, strength, and level. People may judge themselves efficacious across a wide range of activity domains or only in certain domains of functioning. Generality can vary across types of activities, the modalities in which capabilities are expressed (e.g., behavioral, cognitive, affective), situational variations, and the types of individuals toward whom the behavior is directed (Bandura, 2006:313).

He has also written about scales of measurement specifically designed for specific types of efficacy within defined contexts (Bandura, 2006). Yet the accepted sources of self-efficacy are widely used and provide an entry point for working with the concept. *Self-concept* is the source that is the least subject to short-term persuasion in the form of learning. It has an influence on, but is distinct from, self-efficacy. Self-concept is a more expansive, global notion of one's personal essence, including thoughts, feelings and values (Kear, 2000:2). According to Bandura, self-concept is more introspective and descriptive than self-efficacy, which tends to be context-specific and more analytic. In terms of this thesis, attempts to engage with the self-concept of mineworkers could breach the accepted boundaries between guidance and counselling in AET, and may be best left to professionals trained in psychotherapy. *Mastery* experiences are most frequently identified as the principal vehicle of change. 'Through guided mastery we cultivated competences, coping skills, and self-beliefs that enabled people to exercise control over their perceived threats' (Bandura, 2005:22-23). Mastery is further described as experience in overcoming obstacles, and teaching that success usually requires sustained effort. Bandura explains the relationship between mastery, genuine success and perseverance.

Successes build a robust belief in one's efficacy. Failures undermine it. If people have only easy successes they are readily discouraged by failure. Development of a resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. Resilience is also cultivated by learning how to manage failure so it is informative rather than demoralizing (Bandura, 2004:22).

Mastery (successful performance) can lead to a high level of perceived self-efficacy, while experiences of failure lower self-efficacy and impede one's behaviour (Kear, 2000:3). This has obvious implications for education and training, in terms of the need for learners to develop hard skills (i.e. practical skills that have utility in work or life, that earn money or promotion, or are admired by peers) and to have opportunities to demonstrate and experience these as 'mastery' in order to develop their own sense of self-efficacy. As mastery or competence increases, this experience is processed cognitively: 'As a person judges that he is able to competently perform a behaviour, the behaviour is reproduced with increasing confidence' (Kear, 2000:3). The very fact that mastery is identified as the most effective way of creating a strong sense of efficacy differentiates self-efficacy from self-esteem or self-confidence, and points to the relevance of quality AET that facilitates experiences of mastery and competence.

Pajares, a prominent writer on self-efficacy, makes the point:

There are cautions that should be taken as regards the nature and focus of interventions to increase self-efficacy. As is presently the case with self-esteem, there is the danger that self-efficacy may soon also come in a kit. Bandura's (1986a) emphasis that mastery experience is the most influential source of self-efficacy information has important implications for the self-enhancement model... Self-enhancement proponents emphasize educational efforts that focus on improving students' self-beliefs in order to improve achievement. Social cognitive (self-efficacy) theorists focus on the important task of raising competence and confidence through authentic mastery experiences (Pajares, 1997:44).

Another way of creating and strengthening belief in self-efficacy is to experience success vicariously or through *social modelling*. The topic of social modelling was dealt with in detail earlier in this chapter. However, in terms of enhancing self-efficacy, 'Seeing people similar to oneself succeed by sustained effort raises observers' beliefs that they too possess the capabilities to master comparable activities to succeed' (Bandura, 1994:n.p.). Competent models also build efficacy by conveying knowledge and skills for managing environmental demands (Bandura, 2004:622).

Social or para-social learning can be used to contextualize mastery or learning. *Social or verbal persuasion* also strengthens people's beliefs that they have what it takes to succeed. Bandura suggests that the inhibiting self doubts of individuals and their focus on personal deficiencies can be addressed by verbal persuasion. This is more complex than simple positive reinforcement; rather, it is a way of nurturing the fertile ground needed for positive change to begin. 'To the extent that persuasive boosts in perceived self-efficacy lead people to try hard enough to succeed, they promote development of skills and a sense of personal efficacy'; yet the reverse is also possible: 'It is more difficult to instil a high belief of personal efficacy by social persuasion alone than to undermine it' (Bandura, 1994:n.p.). Positive reinforcement of new skills and learning is required, as well as the confidence to enact these. If people are persuaded that they have what it takes to succeed, they exert more effort than if they harbour self-doubts and dwell on personal deficiencies when problems arise. But effective social persuaders do more than convey faith in people's capabilities. They arrange things for others in ways that bring success and avoid placing them prematurely in situations where they are likely to fail (Bandura, 2004: 622).

People are inevitably highly affected by emotions and feelings, and Bandura reminds us that people will also rely on their *somatic and emotional states* in judging their capabilities. Reactions such as stress, fatigue, pain, tension, despondency and mood will be influential. Bandura states that 'positive mood enhances perceived self-efficacy, despondent mood diminishes it.' The fourth way to modify self-efficacy is, therefore, to 'reduce people's stress reactions' and 'misinterpretations of their physical states' (Bandura, 1994:n.p.). Bandura develops this point. He states that people with a high sense of efficacy are likely to view their affective arousal as 'an energising facilitator of performance,' while people who are less self-efficacious are likely to view it as a 'debilitator' (*ibid*). However, the ways in which individuals manage their internal adrenal or arousal levels, interpreting them as stress or excitement, are more likely to be within the confines of psycho-therapy, anger and stress management than H&S training. The boundaries between these different interventions often arise in adult education and training situations, where distinctions have to be drawn between reasonable, empathic engagement with the 'somatic and emotional states' of trainees and those that require referral to differently trained clinicians.

Early on, Bandura recognized *control* as a central issue in human agency and consequently of self-efficacy as well. ‘Among the mechanisms of personal agency, none is more central or pervasive than people’s beliefs in their capability to exercise some measure of control over their own functioning and over environmental events’ (Bandura, 1997; Bandura, 2001:10). The way an individual interprets the locus of *control* in his or her life also affects self-efficacy. The locus of control can be viewed as primarily external, operating by chance or through external control, or internal, as a direct result of personal effort. A relatively high internal locus of control tends to coincide with greater self-efficacy. However, self-efficacy does not consist of a locus of control alone (Bandura, 2005: 26). The locus of control is made up of two main processes, emotive and cognitive. An individual with an active internal locus of control would experience ‘a feeling of control,’ as well as the ‘cognitive process of interpreting a causal relationship between personal action and goal attainment’ (Kear, 2000:3). Pajares’ description of control in self-efficacy (below) has real resonance for workers in South Africa, many of whom faced control barriers in the past:

As regards locus of control, the notion of perceived control is also related to self-efficacy. According to locus of control theory, people expect success to the degree that they feel in control of their behavior, often referred to as internal locus of control, and research supports this contention. People who believe they can control what they learn and perform are more apt to initiate and sustain behaviors directed toward those ends than are those with a low sense of control over their capabilities. In Bandura's social cognitive theory, a sense of control over the significant outcomes of one's life is a key motivator of behavior in addition to self-efficacy. In fact, it is demoralizing for people to believe that they have the capabilities to succeed, but that environmental barriers such as discrimination preclude them from doing so (Pajares, 2007:7).

Control issues probably have significance in many workplace contexts, especially those which operate within well-defined hierarchies, such as mining. Unskilled and semi-skilled workers often function in situations where they experience little control, i.e. where the ‘locus of control’ lies with a superior in the hierarchy. A relatively greater number of underground workers with higher H&S self-efficacy might have more control in influencing H&S practices of work teams. (See next section.)

### 3.4 Collective efficacy

#### *Triadic model*

Collective efficacy is a logical extension of self-efficacy. However, this study is essentially about approaches to training individuals, rather than the social or corporate climate in which individuals work or are trained. Collective efficacy is not as extensively reviewed as self-efficacy, since it is not the primary focus of this study, but the logical connections will be discussed. Most of the sources consulted used the term 'collective efficacy', but Bandura actually conceived a 'Triadic Model of Human Agency' in which human agency operates on three tiers: individually, by proxy, and collectively (Bandura, 2005:26). Collective agency or efficacy is described as follows:

People do not live their lives autonomously. Many of the things they seek are achievable only through socially interdependent effort. I extended the conception of human agency to collective agency rooted in people's shared belief in their joint capabilities to bring about changes in their lives by collective effort (Bandura, 2005:26-27).

Agency by proxy is more subtle and complex:

In many spheres of functioning, people do not have direct control over the social conditions and institutional practices that affect their everyday lives. Under these circumstances, they seek their well-being, security, and valued outcomes through the exercise of proxy agency. In this socially mediated mode of agency, people try by one means or another to get those who have access to resources or expertise or wield influence and power to act at their behest to secure the outcomes they desire (Bandura, 2005:26).

Trade unions shop stewards and H&S representatives are forms of agency by proxy for mineworkers, and it may be useful for mineworkers to analyse and discuss the different forms of collective power that they wield, rather than inevitably defaulting to a proxy agency.

### *Dynamics of group efficacy*

Different forms of collective efficacy can operate at the same time and are therefore also referred to as *group efficacy*. Interactive dynamics within a group create an emergent property that is more than the sum of its individual attributes: it is an emergent group-level attribute (Bandura, 1997:477-478). There are serious analytic challenges in gauging group efficacy. It is not simply an average or total of individual positions. ‘It required clarification that group efficacy represents the different levels of collectivity, the pitting of autonomy against interdependence, individualism against collectivism and individual agency against social structure conceived as an entity’ (Bandura, 2005:26). In general, group efficacy is affected by:

- Mix of knowledge and competencies in the group;
- Leadership of the group;
- Quality of interaction within the group;
- Aggregation of members’ appraisals of their personal capabilities for the functions they can perform for the whole group;
- Aggregation of members’ appraisals of the group’s capabilities as a whole;
- Efficacy beliefs in relation to the larger social system (Bandura, 1997:478).

Inevitably, collective efficacy is partly derived from the individual self-efficacy of group members, i.e. group members’ appraisals of their individual capabilities for a particular function. However, interactive influences affect each member’s appraisal of the group’s capability. ‘Group members are rarely of one mind in their appraisals and perceived group efficacy is best characterised by a representative value for its members and the degree of variability or consensus around that central belief’ (*ibid*).

Collective efficacy can be rooted in the self-efficacy of each individual, because:

- A group of self-doubters is not moulded into a collectively efficacious force;
- A weak link that has to perform interdependently can spell failure;
- A group of highly efficacious individuals may perform poorly if they do not work well together (Bandura, 1997:479-480).

Increasingly, the boundaries of traditional social institutions are changing, and people operate within multiple social systems and within new groupings. Widespread technological changes and globalization of economic forces are creating transnational interdependencies (Bandura, 1997:477). Much research has been conducted on whether the self-efficacy concept is applicable in different contexts, especially in terms of comparisons of Eastern and Western cultures. (See next section on criticisms of self-efficacy.) However, such generalizations do not seem to be possible, as ‘analyses across activity domains and classes of social relationships revealed that people behave communally in some aspects of their lives and individualistically in many other aspects. Within the variety of cultural or collective options, people express their cultural orientations conditionally rather than invariantly depending on incentive conditions’ (Bandura, 2005:27). Considering the complexity, what is the interplay between collective efficacy and positive change?

### ***Group efficacy and change***

Bandura suggests that the vast majority of those who benefit from social reforms are not active participants in bringing about such changes.

If social change depended on everyone participating, it would rarely be attempted because few would believe that a huge populace can be mobilized...

In fact, social reforms are typically the product of an efficacious and highly committed minority of people who invest themselves in shaping a better future (Bandura, 1997:489).

It appears that the *critical mass* required for social change is very high efficacy in a relatively lower number of people, rather than lower efficacy in a higher number of people. Bandura makes the credible observation that ‘Many people shy away from collective action, not because they can gain the benefits without the costs of participation, but because they seriously doubt the group’s efficacy to secure any benefits at all’ (Bandura, 1997:489). The process is driven by people with very high efficacy beliefs who mutually support one another and insulate themselves against discouragement. These change agents derive self-respect from challenging social practices that violate their ethical standards. Perhaps the moral agency previously referred to is activated.

A strong sense of camaraderie provides sustaining interpersonal rewards at a time when tangible benefits of social change may be a long time in coming (Bandura, 1997:489). Bandura cautions against shallow efforts to engage ‘group agency’, an approach that has been promoted and over-used as group learning methodology in education, training and development.

There is much talk of ‘empowerment’ as the vehicle for bettering personal lives. This is a badly misused construct that has become heavily infused with promotional hype, naïve grandiosity, and virtually every brand of political rhetoric. ‘Empowerment’ is not something bestowed through edict. It is gained through development of personal efficacy that enables people to take advantage of opportunities and to remove environmental constraints guarded by those whose interests are served by them. ...Equipping people with a firm belief that they can produce valued effects by their collective action and providing them with the means to do so are the key ingredients in an enablement process (Bandura, 1997:477).

The default group process used in AET and much local policy development, that of a consensus building discussion, is also criticized: ‘A single judgment forged by a group discussion, subject to sway by prestigious individuals, masks the variability in members’ beliefs about their group’s capabilities. A forced consensus can be highly misleading’, (Bandura, 1997:479). Bandura suggests that the consensus reflects a position that nobody is intensely committed to, one that is a compromise for all, but does not completely dismiss negotiation and genuine dialogue. He suggests that such processes can be as useful in setting goals, devising strategies and sustaining the level of effort required to succeed; or dysfunctional and capture the major share of attention, diverting time and energy away from the intended outcome (*ibid*).

### 3.5 Criticisms of self-efficacy

Self-efficacy has naturally been subject to critique and criticism over the years. Endorsements of the concept are embodied in its widespread and long-term uptake in many disciplines and applications. I have organized criticisms of self-efficacy into the following themes or categories:

*Causality*- Self-efficacy predicts but does not cause or change behaviour, so its utility is limited.

*Incompleteness*- Self-efficacy is only one of a number of variables that influence behaviour change, and while the concept is useful, it does not offer a complete explanation of behaviour change.

*Ethnocentricity*- Self-efficacy is largely a Western, American construct that is not universally useful.

*Triviality*- The concept, like others in social psychology, is really common sense and not of serious academic and theoretical value.

#### *Causality*

Hawkins (1995) raised ongoing concerns about the *causality* of self-efficacy and whether it is a predictor rather than a cause of behaviour (Hawkins, 1995:235). Hawkins reviewed many studies of applications of self-efficacy, including pain management, over-eating, bulimia, giving up smoking, diabetes self-care, coping with medical procedures, condom and contraceptive use, phobia alleviation (darkness, height, lifts/elevators), work-related performance, effective career choice, and achievement of student course goals in psychology (Hawkins, 1995:236-237). He conceded that a wide body of literature had demonstrated the association between self-efficacy and success with a range of clinical problems. However, he asserted that these studies really underlined the point that the theory had utility when used to *describe and predict* behaviour, a correlation rather than a causal link (Hawkins, 1995:237). Bandura's response was quick and spirited, and he and Hawkins have engaged in arguments and counter arguments over the years. One of Bandura's counter assertions involved presenting empirical studies of pain tolerance performance that had been manipulated with induced levels of self-efficacy. Research subjects were provided with bogus feedback regarding their pain tolerance and then subjected to pain tolerance tasks.

Perceived self-efficacy seemed to override past performance and was the best way of understanding performance level (Bandura, 1995:181). Bandura seems to have over-reacted. This example does not seem to be much more than a desperate attempt to rationalize the power of suggestion, or to gain ground among quantitatively minded scientists.

Hawkins makes some reasonable and valid points, and says that his intention was to raise issues which could be used to modify rather than discard self-efficacy theory (Hawkins, 1995:235). He and other writers in the discipline (Olson & Zanna, 1993) concur that causation is an eternal problem in the discipline of learning and behaviour change: ‘Causation has long been problematic in the behavioural sciences, as illustrated by decades of argument about whether attitudes cause behaviour or whether behaviour cause attitudes’ (Hawkins, 1995:238). The causality criticism articulates a valuable caution about some of the claims made about self-efficacy, especially in terms of the construct being advocated as an approach to solving all problems. Hawkins concedes to what may be the key aspects of self-efficacy: that self-efficacy can predict complex human behaviours; that a person’s self-efficacy is an index in the choices he/she makes; and that the index is *modifiable* in the case of humans (Hawkins, 1995:238). This surely suggests that it has a place in facilitating behaviour change. Overall, he describes the construct as useful, influential and intuitively appealing (Hawkins, 1995: 235 and 239).

### ***Incompleteness***

The suggestion that self-efficacy is an *incomplete* concept, or even theory, of behaviour change does not really seem to threaten its validity. No single concept/construct can accommodate all aspects governing human action or all the variables that will contribute to behaviour change. An applied concept needs to be lucid and manageable, as Bandura himself stated, referring to ‘a small number of explanatory principles that can account for a wide range of phenomena’ (Bandura, 2005:25). Even Hawkins (1995), who doubted its causality, acknowledged that self-efficacy is a useful index. Other writers commenting on its limitations have made the same observation:

In our view, self-efficacy is a *necessary condition for motivation*. Yet the belief that one can successfully perform an action or control an outcome does not address why one acts, an issue at the very heart of human commitment and engagement. For this reason, self-efficacy theory is unable to distinguish alienated from autonomous actions or predict the consequences that follow from this distinction (Ryan & Deci, 2006:1570).

### ***Ethnocentricity***

Bandura is the son of Polish immigrants, but was educated and has always worked in North American universities. It was inevitable that at some point his work would be challenged in terms of *ethnocentric* bias (Triandis, 1995). Self-efficacy was originally conceived and studied almost exclusively in Western settings, but this has been addressed over time. Numerous studies have been conducted in different clinical and cultural contexts. These primary studies provide fertile grounds for secondary reviews of and deductions about self-efficacy.

In 2004, Klassen stated that: 'Even though self-efficacy has been shown to be a strong predictor of performance with Western populations, less is known about how self-efficacy beliefs operate with non-Western individuals and cultural groups' (Klassen, 2004:206). Consequently, he set out to review studies conducted over a period of 30 years which investigated self-efficacy in specific cultural (non-American) groups, or compared self-efficacy among different geographic or cultural groups. He carefully selected 20 valid, reliable studies which focused on a wide range of settings, including China, Hong Kong, India, Taiwan, Thailand, the former Yugoslavia, Hungary, the Czech republic, Russia, Israel, France, Italy, Costa Rica, Canada, and Australia, plus specific cultural groups, such as Asian, African and Hispanic Americans (*ibid*:209-217). The review does not mention many African settings, but in general appears comprehensive and rigorous. A recurring suggestion in the findings is that some societies or groups are relatively more collectivist, as opposed to individualist, in their efficacy than others.

For example, numerous cross-cultural studies have classified countries and cultural groups according to their degree of individualism and collectivism, with the results showing that European North Americans have the most individual orientation in the world (*ibid*:208). This finding is the result of comparing discrete self-efficacy scores, rather than the range of scores, within a culture.

It is clear from this summary of the research that efficacy beliefs operate differently in non-Western cultures than they do in Western cultures... self-efficacy beliefs were typically higher for participants from Western, individualist cultures than for the participants from Asian, presumably collectivist, settings (Klassen, 2004:225).

Naturally there are collectivists in individualistic cultures and individualists in collectivistic cultures, but at both societal and individual levels, strong perceived efficacy fosters high group effort and performance attainments (Bandura, 1999:35). The individual/collective debate rages on, but some interesting research has been conducted. Voronov and Singer (2002) suggest that I/C factors are too frequently ‘assumed rather than measured,’ and that poverty, rather than any other researched variable, is responsible for collectivist practices in many non-Western settings (Voronov & Singer, 2002:468).

Nations are used as proxies for psychosocial orientations, which are then ascribed to the nations and their members as though they all thought and behaved alike. Residents of Japan get categorized as collectivists, those in the United States as individualists. Cultures are dynamic and internally diverse systems not static monoliths. There is a substantial diversity among societies placed in the same category (Bandura, 2005:27).

Self-efficacy scores may be different for people from different cultures due to the effects of different cultural orientations, such as modesty and self-criticism (Klassen, 2004:219). When calibrated, cross-cultural differences are found in *levels* of efficacy beliefs, but there is also evidence that efficacy beliefs *do* play an important role in the motivation of non-Western cultural groups.

‘Self-efficacy was seen to be highly predictive of performance in both Western and non-Western settings’ (Klassen, 2004:225).

The evidence from this qualitative review suggests that, among collectivists, efficacy beliefs are typically lower but equally or even *more* predictive of performance and that the calibration of their efficacy beliefs and subsequent functioning may be more accurate than among individualists. Second, concepts of self, like self-efficacy, appear not to be fixed, but are amenable to change depending on the context (*ibid*).

Klassen found that there is considerable support for the finding that efficacy beliefs, although rated differently, remain important factors in the motivational functioning of people from individualist and collectivist cultural groups (Klassen, 2004:228). Bandura conducted similar reviews of studies that tested the structure and functional role of efficacy beliefs in diverse cultural milieus across a wide range of age levels, gender, and different spheres of functioning (Bandura, 2002 and 2005). The findings show that a strong sense of efficacy has generalized functional value, regardless of the cultural conditions (Bandura 2005:28). There seems to be substantial support for the conclusions of both Klassen (2004) and Bandura (2002 and 2005) that the self-efficacy construct does have generalized value across different cultural contexts, especially when discrete values or scores are not compared across different settings.

### ***Triviality***

In 1978, a Norwegian psychologist published an influential article which is still cited today: ‘Bandura’s theory of self-efficacy: A set of common sense theorems’ (Smedslund, 1978). The self-efficacy concept was used as an example of what Smedslund viewed as a tendency in psychology to turn essentially common sense observations about life and behaviour into baseless theory. He also declared that much empirical testing in psychology is ‘pointless’ because it tests things that are analytically related, so that a connection or correlation is inevitable. Smedslund has maintained this position about Bandura and self-efficacy and states that: ‘Studies that show that people who do not believe that they can do something do not try to do it are pseudoempirical’ (Smedslund, 1991:331).

His arguments struck a chord among many academics, not so much for the attack on self-efficacy as for the cautions about constructing specious empirical experiments around aspects of behaviour that are logically or analytically related. Smedslund called for a clear distinction in research between verification that is analytic (logically connected by ideas) and verification that is empirical (really needs to be investigated) and continues to advocate a new scientific discipline psychological research which he terms ‘psychologic’ (*ibid*: 325). One of Bandura responses is presented below:

Theory building is a long haul, not for the short winded. The formal version of the theory that appears in print is the distilled product of a lengthy interplay of empirically based inductive activity and conceptually based deductive activity.

Verification of deduced effects is central to experimental inquiry (Bandura, 2004:628).

Critiques of analytic versus empirical approaches to psychological research and the absence of common sense in the discipline have continued to be discussed for many years. However, the debate has moved on and away from self-efficacy, even though it was one of Smedslund’s first illustrative examples. Language use was also criticized, in terms of the way in which common observations and descriptions of behaviour are turned into complicated terminology. Bandura responded to the criticism:

I have no quarrel with people who try to present technical terms in colloquial forms provided the meanings of the psychological constructs and processes are not thereby altered.... Unfortunately all too often the process of simplification strips constructs of significant defining properties or invests them with surplus meanings carried by the colloquialisms. Advances in a field are best achieved by well-defined constructs that fully reflect the phenomena of interest and are rooted in a theory that specifies their determinants, mediating processes, and multiple effects (Bandura, 1990:104).

Language use in self-efficacy debates has proven to be consistent, accessible to many users, subject to explanation and less opaque than in many other areas of psychology and education.

### 3.6 Final comment

#### *Endorsement*

Bandura's own assessment of the merits of a theory is that it must meet three criteria: 'It must have explanatory power, predictive power, and, in the final analysis, it must demonstrate operative power to improve the human condition. Well-founded theory provides solutions to human problems' (Bandura, 2004: 628). Overall, the literature reviewed strongly suggests that the self-efficacy concept has explanatory and predictive power. The application of the concept engages a range of modifiable determinants and a deep acknowledgement of group and contextual dynamics which render it at least some operative power. Self-efficacy reflects Bandura's humanistic, even optimistic, view of human actions. The degree of rationality assumed to be in place in behaviour change may be extreme and open to further inquiry. However, his work adds new depth to and integration of studies of motivation, learning and behaviour change. An essential problem with self-efficacy is associated not with the concept itself but with the term, which is used widely and loosely, often with a shallow appreciation of the complexity of the concept and its task- and context-specificity.

Much empirical evidence now supports Bandura's contention that self-efficacy beliefs touch virtually every aspect of people's lives - whether they think productively, self-debilitatingly, pessimistically or optimistically; how well they motivate themselves and persevere in the face of adversities; their vulnerability to stress and depression, and the life choices they make. Self-efficacy is also a critical determinant of self-regulation (Pajares, 2002:5).

#### *Conclusion*

Self-efficacy has been found to be strongly associated with performance. The utility of the concept lies in its operative qualities and deeper understandings of how efficacy can be addressed via its accepted sources and a clear focus on its task and context specificity. As seen in Chapter 1, the term and concept are widely used in South Africa, with varying degrees of rigour. Sources of self-efficacy may be personal and reside within people, or result from their social and physical environments.

Such efficacy can be addressed by attempting to modify one or more of its sources. The six main sources of efficacy generally discussed are self-concept; mastery; vicarious or social learning; social or verbal persuasion; somatic, emotional or stress reactions; and locus of control. The concept has proven functionality and adaptability in many contexts. It is accessible but not superficial. Overall, the evidence suggests that the self-efficacy concept may be of value in informing approaches to mine H&S training, especially where a shift in emphasis from compliance to self-efficacy is indicated. The identified sources of efficacy provide a reasonable entry point for engagement, but nuanced engagement with both the concept and the context is essential. Ideas in the literature that relate to the self-efficacy concept and relevant sources of efficacy are integrated into the relevant chapters that follow. The six sources of self-efficacy are reconsidered in the framework in Chapter 7.

## CHAPTER 4

# ADULT EDUCATION AND TRAINING (AET) IN SOUTH AFRICA

### 4.1 Introduction

#### *Overview*

The broad aim of this chapter is to learn from the applications of numerous adult literacy and adult education and training (AET) approaches in South Africa.<sup>16</sup> The chapter presents an overview of influential AET theories and concepts that have a history or evidence base in South African contexts comparable to that of this study. These are reviewed in order to gain insights that could inform training approaches to H&S in the demanding local mining context. An additional aim is to learn from the recent and unique history of AET policy and planning in South Africa, and assess the impact of such processes on valid approaches to teaching and learning. By fulfilling these aims, the conclusions of the chapter may illuminate the rationale for multi-disciplinary research.

Mine health and safety and AET programmes appear to have much in common, especially in terms of the socio-demographics of target learners. Many target learners are relatively poor migrant workers who have had limited or no formal education. A lack of education is invariably evident among mineworkers, because underground mining provides employment to those who lack the formal education to seek other, less physically demanding, opportunities. Unlike other AET programmes, mine training programmes usually involve only men, although South Africa differs from many other developing countries in that women tend to be slightly better educated than men.

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<sup>16</sup> This study uses the term adult education and training and the acronym AET, because adult basic education or ABET has created a problematic limit in the conceived continuum of adult learning. It is also a very unappealing term. Mine health and safety programmes are usually provided by ‘training departments’ in mining companies, so simply using ‘adult education’ could cause confusion.

Within South Africa, the most widely used term for literacy and compensatory education for adults is adult basic education and training (ABET), defined as the ‘general conceptual foundation towards lifelong learning and development... applicable to a range of contexts’ (DOE, 1997:12). Mine H&S training usually has a more specific purpose, i.e. to develop health and safety efficacy of workers within a defined mining situation or task, regardless of the workers’ levels of formal or certificated education. Inevitably, H&S programmes have to be designed in ways which accommodate limited educational skills or offer ‘scaffolding’ for further training. The assumed role of ABET in providing this scaffolding for mine H&S is discussed in Chapter 5. The two interventions, AET and H&S training, emerge from very different theoretical and political traditions which have not been integrated, thus demanding multi-disciplinary study.

### ***Multidisciplinary study***

The issue of locating multi-disciplinary studies within adult education is not new. Chilisa and Preece (2005), with reference to adult education in Africa, note that research studies frequently require a multi-disciplinary approach. Adult education researchers include, for example, nurses, doctors, literacy teachers, social workers, trade union activists and agricultural extension workers, all of whom would focus on a problem related to their work. Such researchers are required to negotiate their positions consciously, in order to ensure that the research is acceptable to the researched, within the African context, while at the same time finding a place in the global knowledge system. The authors assert that the adult education researcher also ‘operates within the boundaries of the discipline of adult education’ and that the research problem is required to be located within its discipline. Although research problems may be work- or profession-related and the boundaries of the AET field almost elusive, ‘there remain some common, agreed-upon strands that define the discipline’ (Chilisa & Preece, 2005:74-75).

### ***Organization of literature***

The self-efficacy concept does not feature in South African AET research. The sources that were found related to health education, and are reviewed in Chapter 6. AET in South Africa is not generally a professionalized field of practice, and as such lacks serious status.

Practitioners are not registered, have varying qualifications and are employed in many different institutions. The absence of professional bodies and serious forums, coupled with limited tenure of practitioners and continuity of programmes, has inhibited the level of theoretical engagement beyond the few surviving university adult education departments. Over past decades, the dominant theoretical positions diverged according to the institutional location of programmes and the specific type of adult education programme under discussion. The literature reviewed is organized in the following way:

- The history of adult education, mostly *adult literacy*, approaches and provision in South Africa leading up to 1994;
- AET approaches and provision in the democratic era since 1994, dominated by *national education and training policy*, influenced by ‘competing social movements and political actors’ (Jansen, 1999:4), as well as consultants, the private sector and the trade unions;
- Different *ideological approaches* to adult education, drawn from Europe and the United States, and traditionally included in the curricula of university adult education departments.

Each of these is dealt with below.

## 4.2 Adult literacy in South Africa

### *Adult literacy approaches*

Adult literacy work both around the world and in South Africa has been subject to three mainstream approaches: the *missionary/Laubach*, *radical/Freirian* and *Functional/UNESCO* approaches (Lyster, 1992:28; Morphet, 1992:99-100). Various writers acknowledge these three as the dominant approaches but use different criteria and words to differentiate them. For example, Scribner (1984:8) uses three metaphors of literacy: literacy as a state of grace (or salvation), literacy as power (Freire), and literacy as adaptation (Functional). According to Morphet (1992:99), all three approaches attempt to assert their terms for taking a learner role as agents of transition, but their definitions of the ‘transitional role’ and ‘key institutions’ which sustain the role differ:

- The Laubach approach defines transition as the passage from heathenism to Christian faith. The Church is the key institution and becoming literate is analogous with religious conversion.
- The Freirian approach defines the transitional role as a growing awareness of power relations within society and an active involvement in the making and shaping of history. The key institutions are small groups and political movements.
- The Functional approach sees transition principally in economic and material terms. Modernization is the central term which defines the role of marginal people attempting to survive. The key institutions are the modernizing state or non-governmental organization (NGO) (Morphet, 1992:99-100).

The three approaches are evident in the history of adult literacy provision in South Africa, though agencies embrace elements of each approach at different times. An overview of adult literacy approaches and developments is presented here, since traditional thinking about adult literacy still emerges in local AET debates, although concepts are often not advanced due to limited research capacity and conceptualization.

### ***Literacy and salvation***

The missionary or Laubach approach (literacy for salvation) is associated with the extensive work of Frank Laubach, an American missionary active in the 1930s. He emphasized individual salvation in a spiritual sense, the path from heathenism to salvation, although he was also fixated on the ‘war between Communism and Christianity’. Over the years, he produced phonetic charts in 262 languages, many of which had not been written down before (Lyster, 1992:31). A concern with preserving and understanding scripture is at the core of many religious traditions, Western and non-Western alike (Scribner, 1984:13). The approach and materials have been criticized for their narrow focus and over-reliance on relatively old-fashioned phonic methods. Literacy efforts of Dutch settlers at the Cape in the 1650s are early evidence of literacy as a tool for both colonial and missionary agendas in South Africa. Prinsloo (1999:1) refers to attempts by Jan van Riebeeck, the first Dutch governor at the Cape, to instruct indigenous people in his employment. Although this took place long before the actual formulation of the Laubach approach, the conceptual underpinnings are comparable.

Prinsloo points out that the dynamics associated with acquiring literacy and education were never neutral: ‘The political and economic circumstances under which groups of people first encounter literacy impacts directly on how they take hold of literacy’ (ibid).

It is not merely of historical interest that the inception of literacy in South Africa was so closely bound up with the dynamics of colonial conquest and missionary work, from the 17th through to the 20th centuries. Rather, this has bearing on the facts of literacy today (ibid).

During the 18th and 19th centuries, Christian missionaries came to South Africa from Britain, Germany, France, Norway, Sweden, Switzerland and North America. Missionaries created grammars, spelling systems and orthographies in order to translate the scriptures and create primers and readers in African languages. The missionaries were undoubtedly the major purveyors of literacy in South Africa (ibid: 2).<sup>17</sup> During the latter part of the 19th century, the discovery of diamonds and gold and consequent development in Kimberley and Johannesburg led missionaries to increase educational and religious efforts in these locations:

Black migrant workers from all over Southern Africa converged on these industrial sites. Separated from the tight controls of their home communities, they were seen by the missionaries to be more susceptible to conversion. ...Small literacy groups proliferated in the worker compounds and nearby mission halls of the Kimberley diamond fields and on the Witwatersrand gold mines. Most worked under the guidance of church elders, but many were run by the migrant workers (Prinsloo, 1999:5-6).

### ***Literacy and repression***

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<sup>17</sup> The first book of the Bible which appeared in a South African language was the Gospel of Luke, translated into Setswana by the missionary Robert Moffat and printed in Cape Town in 1830. In 1857 the complete Setswana Bible was published, the first in a South African language. Source: Bible Society of South Africa 12 April 2011.

In the 1920s and 1930s, the South African Communist Party (SACP) organized night schools, mainly concerned with English and politics, for workers around Johannesburg. The surviving texts of one of the leaders of this movement, Eddie Roux, reveal a thoughtful concern with concept and curriculum for adult learners (French, 1992:56). Again, these programmes were offered before the work of Paulo Freire but had a comparable conscientizing approach to the adult learner's situation in society. A point made by Prinsloo (2008) about the reshaping of literacy practices in KwaZulu-Natal in the 17th century could apply to what was happening in the programmes of the SACP nearly 300 years later:

Print literacy came to Africa embedded in a range of specific practices, relationships and artefacts rather than as a unitary package. Shaped by European experiences and interests, these practices were subject to interpretation, translation, recontextualization and re-embedding in a range of localized ways by indigenous people as well as by relocated Europeans (Prinsloo, 2008:114).

These programmes for workers continued until the early 1950s, when they became a victim of repression (French, 1992:56). At the same time, there was an energetic quest for the establishment of Afrikaans as an official language. A powerful alliance of Afrikaner political, financial and intellectual interests led to the translation of the Bible into Afrikaans in 1933<sup>18</sup> and the publication of poetry and popular novels. Although not primarily a literacy campaign, it was an unusually successful drive to promote widespread -albeit sectarian- literacy (French, 1992:55). Such enormous effort has never been made for any other South African language. In 1945, the recommendations of a state Committee on Adult Education, with input from the South African Institute of Race Relations (SAIRR), were supported by the United Party government of the time. According to French, although the terminology has dated, the planning still looks sensible and enlightened. But history intervened and plans for state-led adult education programmes were to remain unfulfilled for more than 50 years (*ibid*:56).

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<sup>18</sup> Source: Bible Society of South Africa. Downloaded 1 May 2011 from <http://www.bybelgenootskap.co.za/index>.

In 1955, the Freedom Charter of the South African Congress Alliance called for a mass state plan to end adult illiteracy.<sup>19</sup> However the National Party government, which came to power in 1948, undermined adult education work in all sectors by neglecting or refusing subsidies to state night schools, banning the SACP, the African National Congress (ANC) and Pan African Congress (PAC), and enforcing legal restraints and the inhibitions of the Group Areas Act and security legislation (*ibid*:56). This kind of repression continued and intensified into the late 1980s.

Until 1986, when the National Literacy Cooperation (NLC) was formed in Cape Town, progressive literacy agencies operated in isolation from one another, which made them especially vulnerable to official and incidental harassment. Communication about approaches, methods and materials improved after the formation of the NLC. Yet even in this tense context of poor material and theoretical resources, there were wonderful innovations in terms of African language literacy methodologies, the bridge to English language for migrant workers, family literacy, easy reading for adults, and sustained community-based provision in very isolated places.

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<sup>19</sup> The **Freedom Charter**, the statement of core principles of the South African Congress Alliance, was officially adopted on June 26, 1955 in Kliptown. The Congress consisted of the African National Congress and its allies, the South African Indian Congress, the South African Congress of Democrats and the Coloured People's Congress. Downloaded from <http://wikipedia.org> 12 April 2011.

Sadly, much of this work is not prominent in the current democratic dispensation.<sup>20</sup>

### ***Functional approach***

The de Lange Investigation into Education, undertaken in 1981 by the Human Sciences Research Council (HSRC), advocated a form of non-formal education, preferably financed by employers, intended to make up for the neglect of formal education suffered by most people in South Africa. As a result, the apartheid state began to take more interest in AET during the 1980s. My own research for NEPI suggested that this interest was underpinned by the functional literacy approach of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), promoted from 1960 onwards. Functional literacy (literacy as adaptation, for modernization and development) emphasizes its survival or pragmatic value and the concept has a strong commonsense appeal (Scribner, 1984:9). UNESCO-supported research suggested a role for adult literacy in addressing unemployment, primary health communication, higher infant mortality and lower fertility rates of women (NEPI, 1993:22-30).

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<sup>20</sup> These developments are too numerous to mention. However, a few are listed below in no particular order:

- *Project Literacy* applied the syllabic literacy method of Paulo Freire using each learner's own name or a word special to him/her, rather than a generic or politically correct key word or Freirian code.
- *Learn and Teach* in Johannesburg supported many isolated adult literacy projects for many years, such as *Bula Mahlo* outside Tzaneen. The project also published an easy-to-read magazine for workers, titled 'Learn and Teach'.
- *Use, Speak and Write English* project consistently applied the concept of learner-centredness in teaching English to adult workers, which enabled learners with immediate use of the language and self-expression in English.
- *English Literacy Project* produced superb, relevant materials for migrant workers dealing with problems of urban life.
- The *New Readers Project* at the University of KwaZulu-Natal in Durban produced many easy-to-read publications in English and Zulu to support newly-literate adults.
- *Learn with Echo* was an English and Zulu educational supplement for adult learners inserted into the Natal Witness newspaper every week, produced by the Centre for Adult Education at the University of KwaZulu-Natal, Pietermaritzburg.
- The *Family Literacy Project* in the KwaZulu-Natal midlands reached many isolated young mothers and their children.
- Practitioners of the Lembede Mda *Literacy Foundation* worked in Soweto hostels under harsh and often dangerous conditions, yet they tirelessly sought out new methods and materials from colleagues in other projects.
- The same can be said for literacy activists from *Rising Sun*, of the African Independent Churches, and *LUCPO*, from the Vaal Triangle.

By 1990, tens of thousands of South African adults were enrolled in official programmes and night schools of the ‘blacks only’ Departments of Education and Training, National Health and Population Development, and Manpower, as well as the South African Defence Force and the South African Prisons Service (van Heerden, 1991:17-18). Most of the adult learners enrolled were completing their secondary schooling, especially ‘second chance’ matriculation.

### ***Paulo Freire and radical adult literacy***

During the anti-apartheid era, and especially during the 1980s, a range of agencies allied to the African National Congress (ANC), the black consciousness movement and many churches were involved in adult education and literacy work. The most influential theorist across these agencies was Paulo Freire, whose *radical adult literacy* approach emerged from his work in Brazil in the 1960s but inspired adult education in sites of struggle all over the world. ‘Of all thinkers in the field of adult education in general and literacy education in particular, Freire’s ideas have had the most potent and rallying appeal’ (Lyster, 1992:37-38). Historically, literacy has been a potent tool in maintaining the hegemony of élites and dominant classes in certain societies, but in Freire’s framework, expansion of literary skills was viewed as a means for poor and politically powerless groups to claim their place in the world (Scribner, 1984:11-12). Briefly, the Freirian listening-dialogue-action approach is based on a key problematic situation, which is then developed into a curriculum; this in turn triggers group dialogue on strategies to address the problem (Wallerstein, 1992:752) The approach offered an appealing alternative to what Freire termed the *banking system* of education, which resulted in passivity and dependence (Freire, 1972). Freire’s concepts of conscientization, dialogue, reflection, action and a communal focus on a germane theme or ‘code’ resonated in the apartheid context of struggle and poor resources. Conscientization is achieved through dialogue, a dialectical process between learner-teacher and teacher-learner. Dialogue, reflection and action ideally harmonize into higher-order practices or action, which Freire termed ‘praxis’. The syllabic literacy method, which involves breaking down a key word or code into syllables and then using those to build new words, was initially advocated in Portuguese. It also worked extremely well in local, syllabic African languages. Freire’s approach made political sense, encouraged collective action, and could work with limited resources. Yet much of the provision was marginal and not

of the quality deserved by adult learners. Essential needs, such as for paper, pens, chairs, tables, reading matter, even light, and especially for safe transport, were not met. Many adult learners expressed a longing for a proper place to learn, real books, the chance to attend a university, and especially for the best possible learning opportunities for their children (van Heerden, 1990:23-49). Even now, the work of Freire retains a moral appeal, but has been subject to criticism as an approach to practice. The method is extremely demanding on facilitators, who themselves need an advanced level of critical consciousness, rendering the approach difficult to implement on a large scale (Lyster, 1992:39). The method/approach is especially demanding on people who have themselves only been exposed to a very authoritarian education, such as in apartheid South Africa. Freire has also failed to explain how conscientization translates into action, or how understanding oppression leads to transformation (ibid:39). Perhaps the essential limitation of Freire is the primary conscientizing agenda itself and its place in the new South Africa - a topic for another thesis. Nevertheless, even if Freire's work does not provide a complete approach for AET, it continues to enlighten practice. The concept of praxis is an accessible tool for encouraging connections between theory and practice, and for nurturing a regard for theory, in the training of educators. Secondly, the concept of dialogue, which was an aspect of the work of Plato, was entrenched in AET by Freire.

### ***Dialogic processes***

Notions of dialogue or dialogic processes have become central to adult education practice. Followers of Freire continue to advocate a process of engagement, much like dialogue, not only between people but with established subject matter as well:

Rather than to view knowledge as static and objective, or as something that exists out there, it must be conceived of as an active process of engagement and involvement between the learner and that which is being learned. ...It must be related to the categories of understanding which learners bring to the learning environment (Goduka, 1999:45).

Gravett (2001:36) describes an optimal process of 'dialogic teaching' for local adult educators which 'is neither content-, learner-, nor teacher-centred, but *learning-centred*, with the teacher serving the agreed-upon role of guide, facilitator and

mediator.' The educator retains an authoritative voice: 'However the tone of teacher utterances can either elicit dialogue or silence learners,' (ibid:37). Dialogue and the analysis of the multiple *dialogic identities* that people bring into multi-cultural situations are advocated in multicultural study (Rogers & Tan, 2008:15-16). Another contribution, *dialogic space*, also contextualizes the concept in local AET. Rule (2004) characterizes emancipatory adult education projects as *dialogic spaces* - social and educational sites that enable dialogue - because they feature dialogue at a number of related levels: between different people, institutions and disciplines; between the programme and broader society; and between the past and the future (Rule, 2004:325). Dialogic space is distinct from the more Utopian notion of a *dialogic site*, following the work of Habermas (Rule, 2004:326):

I prefer to see it as a process that involves conflict, tension and growth; an unfolding of selves within particular contexts. This unfolding or 'breaking through' is enabled by learning spaces that provide a safe environment, encourage openness and trust, and facilitate critical engagement within and among participants, and between participants and their worlds (Rule, 2004:326).

Learning new content does not displace dialogic space: 'The projects, as sites of dialogue, reflect the interests and accents of their different participants, and these are recast in the specific discursive practices of the projects, generating new meanings that reflect the contestation and co-creation of project participants' (ibid:325). Conversely, the notion that dialogue represents the purest learning ethos is also problematic. It makes two assumptions: that all necessary content knowledge is present in the learning group, which is simply not true, especially in formal disciplines; and that a balance of dialogic efficacy exists across a group of individuals, automatically generating productive outcomes for all. Nevertheless, the concept has wide possible applications. Within the mining industry, 'technology transfer' is viewed as an unresolved challenge, i.e. that training and innovations are not carried into the workplace (Willis & Hamilton-Attwell, 1998 and 2002; Macfarlane, 2001; van der Heever, 2002). Many research reports are available on the website of the Safety in Mines Research Advisory Committee (SIMRAC) on the transfer of specific

technologies and innovations. The concept of dialogic space could be valuable in invoking a collective sense of ownership of the technology or idea at stake. Such engagement is critical as no programme plan can anticipate what every adult brings or elects to bring to training, or what barriers he/she anticipates facing in the workplace after training. Dialogic space provides an opportunity for individual workers to engage with content and all other issues related to the programme or H&S generally. Gravett (2001:13) argues that the accumulated experiences of adult learners provides a frame of references that be both a resource and yet also obstruct learning: ‘Consequently, learners’ existing knowledge and experience play a crucial role in learning’ (*ibid*). She outlines a dialogic approach for the actual adult learning classroom which suggests exploring learners’ existing knowledge, linking new learning to such knowledge, acknowledging existing knowledge that may impede learning and addressing the need for immediacy of application of learning (*ibid*:14-16). The challenge lies not in embracing the idea, but in maintaining the conditions required. The process demands time and trust. I have been present when adult learners turned to a zealous new ‘facilitator’ who was insisting on ‘their input’ and asked, ‘If you have nothing to tell us, why are you here?’ Rule suggests the following conditions:

These conditions included: a basis of trust (there can be no dialogue without trust); an attitude of openness towards learning from one another; a physical place where participants could meet in relative safety; a project ethos that encouraged participants to express themselves; and a commitment to solving problems through meeting, discussion, reflection and consensus rather than coercion (Rule, 2004:330).

#### **4.3 National adult education and training (AET) policy**

A section on policy is introduced here because of the critical and pervasive effects of national education and training policy on AET approaches in South Africa over the past two decades.

### Prior to 1994

As shown in the previous sections, until 1994, AET approaches in South Africa were generally based on conventional and universal approaches. There was no national vision of AET in South Africa until 1945 and the state-supported Committee on Adult Education, which was soon abandoned when the Nationalist government came to power in 1948. However significant developments took place during the 1990s.

### Adult education, policy and democracy

The lead-up to and birth of democracy in South Africa in 1994 was an exciting time, especially for adult educators. After decades of being a marginal, voluntary, after-dark type of activity, the practice of adult education was finally legitimized and adult basic education acknowledged in South Africa's new Constitution as a basic right of all individuals:

Everyone has the right:

To a basic education, including adult basic education; and to further education, which the state, through reasonable measures, must make progressively available and accessible (Education: 29(1), Chapter 2, Bill of Rights, Constitution of the Republic of South Africa Act, 108 of 1996).

Over the years, the terminology shifted from adult literacy to adult basic education (ABE), then to adult basic education and training (ABET). Changes in terminology were supposed to represent deep policy and practice reform, but their effect on enhancing practice and provision is open to debate.<sup>21</sup>

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<sup>21</sup> The concept of ABET is uniquely South African. In the English-speaking world, ABE means *Adult Basic Education*. South Africa added the *T* for *Training* in the policy initiatives of the early 1990s. The reasons for adopting the term fell into two main groups.

- One of the deepest critical perceptions of education (including adult education) in South Africa, especially on the part of labour unions and business, was that education had little application in life and work, while training meant drilling in routine jobs with no attention to underlying knowledge and values. Adding the *T* showed a commitment to the *integration* of education and training into ABET.
- ABET grew out of adult literacy work. In spite of fine achievements of adult literacy work in the struggle, literacy alone was not considered adequate to support real social transformation. ABET was meant to offer an appropriately adult route to a general education aimed at making a significant improvement in quality of life.

(Source: Parliamentary Monitoring Group. Downloaded from [www.pmg.org.za](http://www.pmg.org.za) 31 March 2011).

The most concentrated AET developments in terms of conceptualization, policy and planning took place during the 1990s. The first of these was the National Education Policy Investigation (NEPI), which was initiated to develop education policy options for the broad democratic movement, in effect the ANC and its allies. NEPI outlined some key operational areas for future policy attention, including early childhood education, *adult education*, teacher education, educational governance and finance (Jansen, 1999:4-5). I served on both the adult education and adult basic education working groups of NEPI.<sup>22</sup> Adult educators from different sectors presented arguments about the need for long-term compensatory adult and out-of-school youth education programmes and associated institution building. However, their arguments were either not persuasive or were ignored. Some participants believed that the primary adult education intervention in the new South Africa should be a national literacy campaign, ‘like Cuba and Nicaragua’. That was the way of new nations. Approaches, methodologies and logistical concerns about implementing these models effectively within a country as large and diverse as South Africa were raised, but did not turn into a productive policy dialogue. The South African government embraced the rhetoric and symbolism, and a national literacy campaign was listed in the early documents of the Reconstruction and Development Programme (RDP). In fact, the splitting of adult education policy research into two sections (ABET and adult education) was an early indicator that this was the original intention of those in control of policy processes. The low priority of the implementation of adult literacy was evident in the fact that, within the RDP framework, the campaign was dependent on donor funding. According to Jansen (2002:193-4), the tension between high symbolic (a literacy campaign) and low implementation (donor funding) in education policy development was a feature of the political context of the time. His analysis of the policy processes of the era (early 1990s) relies on a conception of policy as political symbolism.

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<sup>22</sup> The work of these two working groups of NEPI culminated in the following two publications:

- NEPI. (1992). National Education Policy Investigation: Adult Basic Education. Report of the Adult Basic Education Research Group. Cape Town: Oxford University Press.
- NEPI. (1993). National Education Policy Investigation Adult Education. Report of the Adult Education Research Group. Cape Town: Oxford University Press.

Policy development in the early period of democracy ‘was about establishing the ideological and political credentials of the new government’ (*ibid*:193). ‘Politicians do not always invent policy in order to change practice. It often represents a search for legitimacy’ (Jansen, 2002:205). In South Africa, however, symbolic policy was also significant in signposting the end of apartheid:

The making of education policy in South Africa is best described as a struggle for the achievement of a broad political symbolism that would mark the shift from apartheid to post-apartheid society. ...Every single case of education policymaking demonstrates, in different ways, the preoccupation of the state with settling policy struggles in the political domain rather than in the realm of practice (Jansen, 2002:193).

Signposting new eras has relevance for many obvious reasons and Jansen does not dismiss symbolic policy, but instead faults policy practitioners’ inadequate understanding of its role in the context of ‘policymaking under conditions of third world transition’ (Jansen, 2002:203). This could apply to the many adult educators who participated in policy fora of the 1990s. There may well have been an inadequate appreciation of the need both for a symbolic policy to mark the change of an era and for a feasible policy underpinned by real plans to ensure delivery. There was a lack of a substantial critique regarding policy development processes in the fora in which I participated, which may ultimately have affected practice and delivery. Political credibility is sought not only by the state. Individuals and successive ministers of education have promoted flawed literacy campaign policies in the interests of their own political standing. Since 1994, successive appointees to the position of national Minister of Education have stated to the cabinet, press conferences and other forums that he/she has the will to ‘break the back of illiteracy’ and address the nation’s adult literacy crisis. A number of poorly conceptualized and under-resourced campaigns have been launched and have subsequently failed: Ithuteng, South African National Literacy Initiative (SANLI), Ikwelo, Tirisano, and Rivoningo (Aitchison, 2008:3; Baatjes, 2003:191). The trend of this type of approach to AET has resulted in insignificant progress in reducing adult illiteracy since the end of the apartheid era (Aitchison, 2008:1; Baatjes, 2008:206, 224; Aitchison & Harley, 2006:98-99; Rule, 2006:17).

### *Conceptual confusion*

By the mid 1990s, the ANC-led government showed signs of a shift from the symbol of a national literacy campaign to national AET plans, and also a shift from emancipatory literacy to a more functional competency-based approach to AET. The ANC Policy Framework for Education and Training (ANC, 1994:45-47) lacked detail on AET, but the launch of the National Multi-Year Implementation Plan for Adult Education and Training (DOE, 1997) was significant. It was the first detailed national programme for AET in South Africa, of the kind which had previously been provided at the discretion of each province.

However, the Plan had three serious problems. First, there was little grasp of financial realities. The chapter on finances cited an unrealistic budget of R19,5 billion, with no indication of the source of funds but a menu of different options for financial advocacy (DOE, 1997:231-235). Only R50 million ever materialized. Second, the Plan made use of symbolic language in a way that was neither valid nor helpful, with phrases such as ‘the eradication of illiteracy’ (*ibid*: 9), ‘developing the capacity of adults to understand the complex reality in which they live,’ and ‘creating critical and participative citizens’ (*ibid*: 23). In my years of work with adults who had received virtually no formal education, I cannot say that they did not generally understand their own reality, or that they were always uncritical and passive; these qualities varied, as they do with any group of people. Third, the Plan vacillated between two conceptual positions, which suggested that there was an inadequate appreciation of either. At one extreme, there was emancipatory campaign-speak, such as that mentioned above, while at the other extreme there was an emphasis on learning areas, unit standards, outcomes, level descriptors and articulation with formal schooling (*ibid*:96-108). The unsatisfactory framing of AET within these dual traditions, instrumentalist (competitiveness, productivity and efficiency) and emancipatory (democracy, redress and human rights), was observed in the later ABET Act (52 of 2000) and continues today (Rule, 2006:121; Baatjes, 2008:207).

In fact, the main focus of the ABET Act is the regulation of centres, mainly state public adult learning centres, which provide formal ABET subjects equivalent to and aligned with the school system.<sup>23</sup>

The labour movement made a massive contribution to the struggle in South Africa, especially after the formation of the Congress of South African Trade Unions (COSATU) in 1985. This meant that during the years of most intense struggle, union education programmes prioritized trade union education and mobilization for wider democratic action, with less priority given to adult education approaches and concepts. In 1991, the National Education Officer of COSATU stated that: ‘Although literacy has not occupied a high priority on the agenda since the formation of COSATU, there is now a commitment by the federation to begin a programme to address the problem. Literacy is now on the agenda’ (Steinberg & Suttner, 1991:136). This did not happen, and may explain why AET policy negotiators representing the labour movement were relatively open to suggestions from the private sector and foreign consultants. During the 1990s, there was surprising rapport and consensus, relative to the times, between trade union and private sector negotiators who had been long and bitter adversaries in South Africa. The common vision may have been due to a shared economic or monetary bias. The private sector was inevitably concerned with profits and affected by the current influences of globalization and neo-liberalism, with the emphasis on competitive markets. The labour movement was naturally concerned with employment and may have retained an historical Marxist concern with the significance of an economic rationale. The two sectors (industry and labour) formed a powerful lobby for outcomes or competency-based education and the integration of education and training. ‘Organized labour’s vision of a new outcomes-based system was based on the urgent needs of workers for education and training, rather than on the reform of schooling, vocational and higher education’ (Cretchley & Castle, 2001:490). There had been no reference whatsoever to outcomes-based education (OBE) in the NEPI policy work, completed in 1992/3, and only broad suggestions

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<sup>23</sup> Adult Basic Education and Training Act, 2000: Chapter 1: Definitions and Application of Act. To regulate adult basic education and training; to provide for the establishment, governance and funding of public adult learning centres; to provide for the registration of private adult learning centres; to provide for quality assurance and quality promotion in adult basic education and training; to provide for transitional arrangements; and to provide for matters connected therewith.

about a coordinated system of education and training (Jansen, 1999:4-5; NEPI, 1992:66-72). Global trends were reinforced by foreign consultants:

Policymakers, responding to economic and political imperatives to develop a more skilled and flexible workforce, turned to overseas models of integrated education and training systems. This line of thinking was given impetus by international bodies such as the World Bank and the Organization for Economic Co-operation and Development, which proposed vocationally-oriented, national education and training systems based on a competency education model (Cretchley & Castle, 2001:489).

A competency- or standards-based system became national policy with the passing of the South African Qualifications Authority (SAQA) Act (No. 58 of 1995) on 4 October 1995. Education and training were to be integrated into one national qualifications framework (NQF). The new bias in all education policy was perceived as related to the national macroeconomic Growth, Employment and Redistribution (GEAR) strategy: AET policy became subject to new tendencies, with an emphasis on 'global competitiveness and on an effective workforce' (Rule, 2006:120).

The bias was also evident in AET in the West:

Contemporary versions stress the need to establish or maintain competitive advantage in international trading and attractiveness to investment, and social cohesion and community integration and responsiveness. Active reflection is not expected and the main requirement from people is that they rise to the challenge of change and modify and adjust to reap the potential benefits for all (O'Sullivan, 2008:19).

### ***Outcomes-based education and training (OBET)***

By the late 1990s, policy change was so rapid and dramatic that the underpinning development processes may have been equally hasty. The adoption of both propositions - an outcomes-based system and the integration of education and training - resulted in new acronyms (OBET and ABET) and new confusion. With reference to these developments, a leading adult educator observed that:

'The system is so complex that an industry has emerged in South Africa purely to explain the bewildering array of level descriptors, unit standards, learning programmes, critical cross field outcomes, etc.' (Lyster, 1997:7). In theory, OBE specifies beforehand, in terms of performance, what learners should be able to do at the end of a course of study and what they will be required to demonstrate. Curriculum, syllabus and timeframes vary according to the inputs required by each learner to demonstrate the prescribed performance outcome. Of course, this is rarely feasible in practice with formal programme and assessment timetables. Real integration of education and training is also rarely seen in practice, but defaults to arrangements such as learners attending literacy on one day and welding on another. The facilitation of any valid form of OBET (or ABET) would require exceptional skills, not readily available in the poorly-resourced adult education sector:

While ABET facilitators are not a homogenous group, it has been noted that those who come from a schooling background prior to OBE sometimes bring with them modes of teaching that may not promote this approach. In addition, ABET facilitators are a fairly fluid group of professionals, in the sense that most of them are contract workers who are not institution-based: this makes it difficult to build up the necessary communities of practice that are so central to the teaching profession. Furthermore, it is generally acknowledged that there may be gaps in both the subject matter expertise and the education, training and development experience of many ABET facilitators (King, 2008:41).

The National Qualifications Framework Act No 67 of 2008 Act replaced the SAQA Act, but the system and framework are still largely in place for AET. The framework is presented in the next table.

**Table 12: South African National Qualifications Framework (NQF)**

NQF LEVEL	BAND	QUALIFICATION TYPE
8	HIGHER EDUCATION AND TRAINING	Post-doctoral research degrees Doctorates Masters degrees
7		Professional Qualifications Honours degrees
6		National first degrees Higher diplomas
5		National diplomas National certificates
<b>FURTHER EDUCATION AND TRAINING CERTIFICATE</b>		
4	FURTHER EDUCATION AND TRAINING	National certificates
3		
2		
<b>GENERAL EDUCATION AND TRAINING CERTIFICATED</b>		
1	GENERAL EDUCATION AND TRAINING	Grade 9
		National certificates
		ABET Level 4

Adult educators in South Africa have always raised concerns about the structure and levels of the NQF because AET is marginalised; and so many South African adults are consequently excluded from the framework and unit standard aligned training options. Qualifications and skills programmes for adult workers are largely aligned to public, registered unit standards. However all unit standards are assigned a NQF level, the lowest of which is NQF level 1 or Grade 9 which equates to some secondary schooling. NQF level descriptors apply to all unit standards based training programmes, whether they are full qualifications or skills programmes.<sup>24</sup> The current level descriptor for the least educationally demanding level of the framework, NQF 1, demands sound reading and writing skills (See Appendix A sourced from SAQA).

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<sup>24</sup> I contacted the South African Qualifications Authority (SAQA) for confirmation regarding the application of level descriptors in RPL processes by telephone and email on 15.8.2011. I was assured by the help desk that the information above is accurate, but the operator asked me to confirm the details with her superiors. I have received no reply to my emails.

Theoretically, recognition of prior learning (RPL) processes can be conducted by training providers in order to offer less educated workers access to training programmes, which are pitched at NQF levels higher than their formal education. However the application of the level descriptors excludes many people because they lack both the formal education and the informal skills to cope with RPL processes which would facilitate their inclusion. Other observations of experienced practitioners are that level descriptors are not really applied during industry-based RPL processes and that the theoretical aspects of training are often simply ignored by providers (le Roux, 2011: Personal Communication). Adults can endeavour to attend the few ABET programmes that offer subjects almost identical to those offered by schools. Yet nationally recognised certification is offered only for Communications and Mathematics by the Independent Examinations Board or the Department of Education, below NQF level 1. Furthermore, anecdotal evidence suggests the six or seven subjects required for a nationally recognized ABET level 4 or NQF 1 General Education and Training Certificate can involve an adult learner in seven years of part-time study. The reward is negligible compared to the effort. This issue is discussed further in Chapter 5 in the context of ABET in the mining industry. In terms of serving the interests of less educated adult workers, the levels of the NQF provide quite flawed policy. The interests of these adults have not been successfully advocated in post-apartheid South Africa by any group. The low priority of adult education among important stakeholders and the low status of adult education and adult educators generally have all exacerbated the continuing and unaddressed problem.

When the NQF Act replaced the SAQA Act, the role and functions of different bodies in the system changed. Currently, there are three quality councils responsible for the development and quality assurance of qualifications. Umalusi is the quality council for General and Further Education and Training, including AET. The Council on Higher Education (CHE) is responsible for Higher Education, and the Quality Council for Trades and Occupations is the quality council for occupations and consequently for the mining sector. Opportunities for employed adults who lack formal schooling remain largely unregulated. Their preparation and training for the world of work (H&S and other) is thus left to the discretion of employers and the training providers

appointed by sectoral training authorities.<sup>25</sup> The future of unit standards is generally unclear, but remains the choice of the Quality Council for Trades and Occupations, the quality council under which the mining industry training is usually accommodated. The future of standards-generating bodies as the authors of unit standards is equally unclear:

In terms of the new NQF Act the operational responsibility for the generation of qualifications will be the responsibility of the Quality Councils, and they will decide how best to utilise the expertise of SGBs. It seems likely that the new landscape will still need the expertise that characterised the SGBs and thence will develop new communities of practice to cover all sectors (SAQA, 2011:n.p.).

The lack of clarity regarding the authorship of unit standards is a concern as it is central to the quality and validity of the system. Initially, unit standards were written by standards-generating bodies (SGBs), comprising individuals with expertise in the subject of the qualification. The qualifications and unit standards would be approved by national standards bodies (NSBs), made up of representatives of stakeholder groups. This arrangement, however, did not last. In 2005, the NSBs were disbanded and their function was taken over by specially convened consultative panels. Unit standards can enhance practice by facilitating consensus regarding common goals across sectors in encouraging practitioners to formulate precise, overt goals for programmes. Such practices would be essential to mine H&S. Other experiences of unit standard-based approaches in local AET have been found to fragment knowledge and learning into trivial specific outcomes which do not necessarily integrate into a productive curriculum. Teaching adults to read has suffered particularly under OBET due to the misunderstanding of prescribed outcomes; the limited view of literacy is due to its functional uses and political correctness (non-racism, non-sexism etc.), and the fact that the reading of fiction - essential for fluency - is not embraced (Lyster, 2007:n.p.).

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<sup>25</sup> I checked the accuracy of this statement with the Umalusi Quality Council on 19 August 2011, but my informant wished to remain anonymous. The Department of Labour offers programmes for unemployed adults, but these are not within the focus of this study.

As Cretchley and Castle (2001:499) observe: ‘There is nothing about outcomes-based education itself which guarantees that learning outcomes will be relevant or meaningful to the learner, nor is there anything that guarantees that they will not be relevant.’ It depends to a large degree on the clarity, coherence and appropriate level of detail in the unit standards produced. Yet the maintenance of the quality of all of the unit standards across so many sectors of education and training is not always evident. Overall, the history and achievements of OBET may have been no better in fundamental adult education, such as literacy, numeracy and language, than they have been in schooling. In 2009, after years of crisis, the Minister of Basic Education announced to parliament that ‘...there is no longer OBE. We have completely done away with it... we need to focus attention on dedicated, inspired teaching based on a curriculum that is teachable’ (Motshekga, 2009:n.p.). The policy of OBE has been verbally rejected for education in South Africa, but is still legislated in AET practice. Consequently, its use across the spectrum of AET requires much more interrogation. The debate over the integration of education and training appears to have been suspended.

### ***The state and the rights of adult learners***

Tracking the history of policy and related implementation decisions, it is clear that the choice of approaches and associated methods to be used in AET (and other sectors), while never entirely logical, is political. Nor is choice based on the proven merits of an approach or on valid research. Recommended approaches and concepts are misinterpreted, distorted and chosen for a variety of reasons other than their researched value in teaching and learning. The careful modification for local conditions is often overlooked. The past 15 years have been disappointing in terms of AET developments. The current NQF levels provide a flawed policy in serving the interests of less formally educated adults. It has also been argued that current adult literacy provision amounts to a constitutional violation: ‘A variety of statistical sources indicate that the adult literacy rate in South Africa has not improved significantly over the last ten years and that the government is therefore not fulfilling its constitutional obligation to make ABE available and accessible’ (Rule, 2006:130). As each set of South African census figures is published, the actual numbers of adults in each category - such as literate, illiterate, some schooling, schooling complete - grows, suggesting that the trend is not improving:

The record over the last decade raises grave doubts about whether there will be any significant reduction of adult illiteracy in the next ten years – an untenable state of affairs for a country of South Africa’s resources, democratic character and leadership profile on the continent and internationally (Rule, 2006:119).

Denis O’Sullivan (1993:103) theorized about legitimacy in adult education and how different forms of legitimacy (charismatic, normative, traditional, rational) change and dominate in the course of a programme’s history and development. His observations may be relevant to the changing context of South Africa. Charismatic and traditional (historical) legitimacy are self-explanatory; normative legitimacy is established by association, by virtue of shared values and beliefs; while rational legitimacy is based on legally or professionally defined roles (O’Sullivan, 1993:103-129). Programmes are rarely confined to any one of these appeals, and legitimacy is not a constant but needs to be maintained:

For example, at the early stages of a programme’s operation charisma is a distinct asset. Charisma, however, will rarely sustain legitimacy as a programme evolves and systematises. Operationally, established programmes will supplement charisma, where it exists, with other bases for the legitimatory claims of their message (O’Sullivan, 1993:105).

Both Jansen (2002:204) and O’Sullivan (1993:104) agree that legitimacy has a role in the interaction between policy, programme and people or participants. In terms of O’Sullivan’s analysis, state efforts for AET in South Africa may yet develop more mature sources of legitimacy, such as those described as normative (shared values) and rational (professional) legitimacy. These would be valuable for ongoing policy and practice developments in the future.

#### **4.4 Ideological approaches to adult education**

##### ***Malcolm Knowles and andragogy***

Adult education departments in South African universities generally include a range of theoretical perspectives in their curricula. Adult educators enrolled in these programmes are drawn from all AET sectors, including the state, industry, non-

governmental and church-based programmes. Consequently, these perspectives have been widely disseminated across the AET field over the years. This study, which seeks a more intelligent and theoretical approach to H&S training, may sound like a quest for an adequate pedagogy, which in turn could lead to the suggestion of Malcolm Knowles' concept of *andragogy*. Besides the work of Freire, andragogy has been the most influential, most persistent and best-known theoretical construct of the field of adult education for over three decades (Rachal, 2002:225; Jarvis, 1995:93). 'Andragogy became part of the mainstream of adult education in the Anglophone world and has acquired the status of established doctrine in South Africa' (Cretchley & Castle, 2001:494,487). Knowles (1980:43) defined andragogy as 'the art and science of helping adults learn,' though it has also been described as both a philosophy and a method (Rachal, 2002:219). Essentially, andragogy was premised on two main features: the difference between adult and child learners, adults requiring a different pedagogy (andragogy), and the capacity of each adult learner to define his or her unique learning requirements by drawing on his/her life experiences (learner-centredness). Knowles' assumptions about the characteristics of adult learners, which distinguish them from children and demand a different pedagogy (andragogy), summarized over time, are presented below:

1. *Self-concept*: As a person matures, his self-concept moves from one of being a dependent personality toward one of being a self-directed human being.
2. *Experience*: As a person matures, he accumulates a growing reservoir of experience that becomes an increasing resource for learning.
3. *Readiness to learn*: As a person matures, his readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.
4. *Orientation to learning*: As a person matures, his time perspective changes from one of postponed application of knowledge to immediacy of application, and his orientation toward learning shifts from one of subject-centredness to one of problem-centredness.
5. *Motivation to learn*: As a person matures, the motivation to learn is internal. (Knowles, 1984:12).

Common sense dictates that the distinctions are questionable or at least over-emphasized. Children are also unique, have different experiences, and move from dependence towards independence. The assumptions above could apply equally to comparisons between any two different developmental stages of children or adolescents. This distinction between andragogy and pedagogy is based on an inaccurately conceived notion of pedagogy (Day & Baskett, 1982:150). There are behavioural, experiential and inter-personal differences between learning groups comprising children and those made up of adults who may wish to be treated differently, but this does not logically constitute an entirely different pedagogy.<sup>26</sup> In fact, anecdotal evidence from South African ‘night schools’ indicates that the best day school teachers of children are also the best night school educators of adults, because they have certain qualities. These include being knowledgeable, diligent, prepared, organized, communicative, patient and empathic. In its purest form, andragogy would mean that the role of the educator is not to teach, but to facilitate a process of self-directed enquiry, in which adult learners determine the parameters and objectives of their own learning by drawing on their prior experiences (Cretchley & Castle, 2001:493; Rachal, 2002:219). For Knowles, the adult’s experience is primary: adults enter new learning situations with a rich reservoir of experience from which to draw – indeed it is their accumulation of experience that chiefly distinguishes their learning needs from those of children (Cretchley & Castle, 2001: 493). The focus on negotiating the entire learning experience with an individual or a group of learners is known as *learner-centredness*. However, it has proved to be idealistic and unrealistic in South Africa:

The implication that curricula should be constructed through negotiation with each group of learners has been taken up by many adult educators in informal contexts unconstrained by formal certification, yet attempts to empower groups of adult learners in this way have all too often led to muddle, frustration and the waste of resources (Cretchley & Castle, 2001:493).

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<sup>26</sup>Discussion with a respected colleague suggested that the term andragogy, which was current in the 1970s and 1980s, is now regarded as a ‘curiosity’. The term pedagogy is now used in both adult and children’s education. Some universities have used the term ‘didactics’ as similar in meaning to education and training approach, though often referring to practices and plans, rather than higher-order assumptions and frameworks (French, 2011).

Knowles' regard for the contextual experience of the adult learner has value, such as the concept of dialogic space discussed earlier (Rule, 2004). Any workplace application of new learning would be dependent on accessing and activating the 'rich reservoir of experience' that workers have of underground mine practices. The concept of andragogy is accessible and useful to university-based programmes in alerting adult educators to think about their practice and consider more responsive attitudes to adult learners, but it has been thoroughly criticized over time. While Knowles focused on something quite significant to adult learning, his formulation is rather weak, not based upon extensive research findings, nor is it the total picture of adult learning (Jarvis, 1995:92). While most adult educators would be sympathetic to the spirit of andragogy, it remains an unstable theoretical foundation upon which to prescribe practice (Rachal, 2002:224). The past appeal of the concept has been attributed to its timing. Critiques of andragogy point out that its humanist conception suited certain eras, such as the romantic 1960s of the West and the brutal constraints of apartheid South Africa (Cretchley & Castle, 2001:494):

The andragogical approach offered an alternative to education dominated by the goals and philosophies of an undemocratic state which had a firm grip on formal education at primary and secondary level. Adult education and higher education provided at least some space for resistance by empowering the individual (Cretchley & Castle, 2001:494).

### ***Participatory, empowerment and transformational learning***

An ongoing development influenced by the work of Freire, as well as by humanist psychologists such as Carl Rogers, is a cluster of approaches variously referred to as participatory, as empowerment, or, more recently, as transformational learning. The primary aim of these approaches is to develop the individual learner within an educational framework, the achievement of which can only be evaluated by non-educational criteria (Jarvis, 1995:99). O'Sullivan (2008) acknowledges a great many theoretical resources, which include:

Hogan and Habermas on communicating a programme's intentions; Weber and Lukes on power and legitimacy; Hirst, Habermas and Phenix on the forms and functions of knowledge; Brim, Berger and Luckmann, Freire and Giroux on personal change; Mezirow, Goffman and Garfinkel on the social context of personal change; and Wittgenstein, Bourdieu, Foucault, Derrida and Baudrillard on language, discourse and power (O'Sullivan, 2008:15).

Jack Mezirow is considered to be the major current developer of transformative learning theory, but many other perspectives about transformative learning are emerging (Gravett, 2001:23; Cranton, 2002:65). These are far too numerous to explore here. Summarizing his writing over time, Mezirow regards primary change as occurring in the psychological 'perspectives' of the learner. Change occurs in cycles that start with a disorientating dilemma, continue through many stages or steps of assessment, meaning making and reflectivity, and end with reintegration into society or a restored equilibrium (Cranton, 2002:66; Jarvis, 1995:95; Imel, 1990). The main difference between Mezirow and other empowerment theorists is that he does not overtly promote social change, but changes the learner's perspective of and role in society. Social change and redistribution of resources are core objectives in other empowerment approaches, such as participatory appraisal and participatory rural appraisal. Theoretical endorsement for such approaches in AET and H&S training is found in both local and international literature (Wallerstein, 1992; Brookfield, 1998; Goduka, 1999; Taylor 2000; Lippin, Eckman, Calkin, & McQuiston, 2000; Cranton, 2002; Easton, 2005; Kiggundu, 2005).

Active participatory methods and techniques are usually associated with these approaches, and any number of them can be used to provide opportunities for adults to share feelings and personal/communal relationships, overcome inhibitions and creatively identify solutions (Guevara, 2002:25). The assumption is that learners or workers *know* how to respond to critical problems but require facilitation in assertiveness and collective action. This may apply to some workplace safety issues, such as claiming benefits or reporting faulty machinery. However, other H&S safety issues will naturally require new content input and learning. Many mineworkers work long shifts and live in hostels with the same people, and are consequently eager to gain new information, new insights and exposure to new people from training

programmes. Actual implementation of pure empowerment approaches presents overwhelming challenges (Guevara, 2002; Lyster, 1992:39; Cretchley & Castle, 2001:493). Various stages, facets and strategies are advised, and the learning process is extremely time-consuming.<sup>27</sup> Ultimately, transformative learning is described as being conditional upon critical challenge:

There are no particular teaching methods that guarantee transformative learning. A provocative statement in a lecture, a story told by a fellow student, or an argument set out in an article are just as likely to stimulate critical self-reflection as is the most carefully crafted exercise. ...It is this environment of challenge that underlies teaching for transformation. Although this challenge must be combined with safety, support, and a sense of learner empowerment, it is, at the center, a challenge of our beliefs, assumptions, and perspectives that leads us to question ourselves (Cranton, 2002:66).

According to Cranton (2002:66), critical challenge can be initiated by ‘creating an activating event’ which engages the attention of adult learners (not to be confused with an ice-breaker activity). Challenge takes different forms, however, and intellectual challenge is not the same as the challenge of existing perspectives or

<sup>27</sup> Cranton (2002) proposed strategies for transformative learning:

*Creating an activating event-* Films, documentaries, novels, short stories, etc., portray unusual perspectives in dramatic and interesting ways, discrepant with learners’ own.

*Articulating assumptions -* Questions are crafted so as to encourage students to describe what they believe and how they came to believe it.

*Critical self-reflection-* Consider the consequences of holding certain assumptions. Critical self-reflection may take place in the classroom, but it is perhaps more likely to take place outside it.

*Openness to alternatives -* Create safe and enjoyable ways for people to try on different points of view

*Discourse-* This requires having accurate and complete information, being free from coercion and distorting self-deception, weighing evidence and assessing arguments, being open to alternative perspectives, critically reflecting on presuppositions, and having equal opportunity to participate.

*Revision of assumptions and perspectives -* When students actually revise their assumptions or larger frames of reference, there is little we can do, aside from giving support and encouraging students to connect with each other.

*Acting on revisions-* Often, such action falls outside the learning programme. Field trips or site visits, keeping a log or journal, or other follow-up activities are required

(Cranton, 2002:66-70).

beliefs. For example, South African workers have cultural or other beliefs that cannot be challenged in the course of one training event or programme. The challenge of working with, around or against such long-held beliefs is discussed in Chapter 6. Intellectual challenge could apply to good material, or the way in which information is organized and presented. New learning may also be essential, but is under-emphasized, even ignored, in empowerment approaches:

Clearly, the academic disciplines appear to be less significant than the immediacy and relevance of problems and experiences, although there is a need for considerably more research into effective adult learning of academic disciplines, which occur as adults are gaining more opportunities to study for academic and professional qualifications on a part-time basis. For instance, there may be a relationship between experience and the disciplines being studied, etc. which requires more exploration (Jarvis, 1995:99-100).

The value of building on adult learners' experiences, knowledge and perspectives in a nurturing environment is universally endorsed in the literature. Participatory learning experiences within a programme provide space for significant processes: developing a sense of ownership of an issue among learners, processing and challenging new ideas, and reinforcing learning. However, participatory, empowerment and transitional approaches do not add enough to the work of Freire and Knowles to inspire the confidence of this study. While the approaches have strengths, they also have inherent problems:

- the conceptual confusion between empowering approaches and participatory methods;
- the intense demands made on facilitators who are required to provide group or learner-specific curricula;
- the assumption that all problems can be addressed without the introduction of new content;
- the amount of time consumed by the processes, especially in formalized situations such as the workplace.

### ***Moral tendency***

Education and training is never neutral, and of course the whole person is relevant in AET programmes. Moreover, there is a presumptuous aspect to most of the approaches discussed. The underlying tendency is to assert a kind of moral superiority over adult learners, whether the ultimate goal is salvation or raising the level of consciousness for the purpose of political change or their own H&S. Many of the advocated approaches aim not simply to address a problem, but to transform the person, his/her perspectives, interaction with society, or society itself. OBET is certainly less subject to this criticism, while self-efficacy in its original conceptualization is task- and context-specific. The wider the focus of the proposed transformation, the more this tendency is exposed, attempting to transform the whole person, rather than simply providing a whole person with a valuable and additional skill. Adult learners in South Africa certainly lack specific skills, but this does not render them generally oppressed or ineffectual in all aspects of their lives. Each adult will choose what he or she brings to bear on the learning situation. In my experience, adult learners in South Africa are sensitive and resistant to any training underpinned with messages that can be interpreted as: ‘I will sort you out,’ ‘You need to change,’ ‘The way you are is not good enough,’ or ‘It’s your fault, you should do more to fix things.’ Chilisa and Preece (2005) caution about comparable covert tendencies in adult education research in Africa, in which researchers use their own informed ‘ways of perceiving reality and values as standards against which they view, name, label, describe, write and make conclusions about the researched’ (*ibid*:236). They go on to describe such ideological bias as ‘the most resilient, pervasive, traumatising and damaging unethical practice in research (*ibid*). In the very tough, cynical and direct culture of mining, such tendencies will be unwelcome. A softer but related redemptive tendency has been observed in Irish adult education:

A constraint on turning theory on ourselves in facing this challenge lies in the dominance of redemption in Irish adult education thought and practice, the aspiration to ‘put things right’, be it in terms of skill deficiencies, limited perspectives, inappropriate beliefs and feelings or a flawed social order. This is done in the interests of the student, but from the standpoint of the adult educator. In this, the function of the adult educator to variously expand, develop, re-skill, lead and enlighten is unquestioned. Students are construed as beneficiaries and not without justification. Yet, the effect can itself be limiting and restrictive (O’Sullivan, 2008:29).

#### 4.5 Conclusions

Much can be learned from experiences of AET in South Africa alone, insights and hindsight. Policy decisions are invariably political and affect the selection of approaches and associated methods to be implemented in AET (and other sectors). The political context of the early 1990s led to the development of certain symbolic policies for AET, which logically sought to enhance the legitimacy of the government and mark the end of apartheid. However current national education and training policy marginalises AET processes and adults who lack formal schooling. Unit standards-based policy has had a critical and pervasive effect on approaches to AET as it places precedence on accredited training over advocacy and awareness programmes. Countless adults in South Africa lack the educational scaffolding for NQF linked qualifications and skills programmes; or the informal skills to be included in such programmes via RPL processes. Research has shown that policy and provisioning of AET have been inadequate in the post-apartheid era and the current NQF levels provide a flawed policy in serving the interests of less formally educated adults.

As in the past with missionaries and tyrants, the political and economic circumstances of learning continue to have an effect. Relevant variables will differ in each learning site but could involve selection and grouping of learners, with an effect on work record and earnings. Only real engagement and acknowledgement of all the participants will uncover these issues. The very significant issue of learning new content is not productively dealt with in any of the approaches covered in this chapter.

The utility of outcomes-based approaches is open to debate, but is highly dependent on the quality of the unit standards produced, while empowerment approaches allow for minimal assurance of curriculum and content. The assumption that adult learners possess adequate knowledge to respond to critical problems may apply to some workplace safety issues, such as reporting faulty machinery. Most mine H&S issues, however, require new content learning, especially in a context of ongoing technological development and low levels of formal education that result in limited knowledge of pertinent subjects, such as lung diseases, geology, chemicals, and electricity.

Information is more effectively communicated if associated with some form of cognitive or intellectual challenge, starting with an activating event. Many AET approaches make use of the concept of dialogue. The most pragmatic of those reviewed, with regard to mine H&S, is the concept of *dialogic space*. It does not discount new content learning, but acknowledges the real challenge of critical engagement in the diverse South African context and points to the demands made on and responsibilities of all participants in the process. There is a *presumptuous* or *redemptive tendency* in many of the approaches discussed above, whether the ultimate goal is salvation or raising the level of consciousness of adult learners for the purpose of political change or their own H&S. In spite of the wealth of ideas in the AET debates and rich experiences of past years, this study requires additional input from *other disciplines*, a dilemma that has been articulated before:

I can only speak of my own dilemmas as an adult educator and my search for theoretical resources to engage with them. Far from resolving them, at most I find myself with accommodations, holding positions and bracketed issues, all of which are necessary if nihilism and disablement are to be avoided. Inevitably these are products of my own individual positioning and cultural biography. Yet, the issues involved go to the heart of educational and social life and include communication, meaning-making, culture, social action, individual and social change, human agency and social justice. As I have indicated, I have come to regard these as even more complex than I had imagined and, accordingly, demanding a more elaborate and interdisciplinary theorisation (O'Sullivan, 2004:30).

## CHAPTER 5

# EDUCATION AND TRAINING IN THE MINING SECTOR

### 5.1 Introduction

#### *Scope and purpose*

This chapter reviews the available information on education and training in the local mining sector, especially with regard to H&S. It also includes information on related topics, such as adult basic education and training (ABET), the connection between education and safety, and approaches used in H&S programmes. The chapter aims to identify main trends and useful research which could facilitate the H&S efficacy of South African mineworkers or contribute to such a training approach. Specific features of the context, such as language use, are also considered in order to validate the grounding of this study.

### 5.2 Current legislation and policy

#### **MHSA**

As stated before, Section 10 of the MHSA focuses on training and full compliance would ideally translate into a comprehensive H&S training system. The onus is on managers, rather than employers, to provide H&S training to all employees, without the employees being made to pay for such training.<sup>28</sup>

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<sup>28</sup>(1) As far as is reasonably practicable, every manager must:

- (a) provide employees with any information, instruction, training or supervision that is necessary to enable them to perform their work safely and without risk to health; and
- (b) ensure that every employee becomes familiar with work-related hazards and risks and the measures that must be taken to eliminate, control and minimize those hazards and risks.

(2) As far as is reasonably practicable, every manager must ensure that every employee is properly trained:

- (a) to deal with every risk to the employee's health or safety that (i) is associated with any work that the employee has to perform; and (ii) has been recorded in terms of section 11;
- (b) in the measures necessary to eliminate, control and minimize those risks to health or safety;
- (c) in the procedures to be followed to perform that employee's work; and
- (d) in relevant emergency procedures.

According to amendments passed in 2008, employers must keep a record of all training provided, and all mines must submit a workplace skills plan and annual training reports to the MSA.

### ***Logic of H&S training***

The current legislation, policy and H&S education and training approaches have been influenced by the long history of mining in South Africa and by H&S developments across the whole mining world. Smith and Mulder (2004) summarize the eras of mine H&S management in South Africa in the following table:

**Table 13: The eras of mine safety management in South Africa**

1900	Focus on design and physical clean-up
1931	Workplace accidents, illnesses due to unsafe acts (88%) & unsafe conditions (10%)*
1950	Safety management systems
1960	Training and development of personnel started
1970	OHS Act and Minerals Act
1980	Psychology of safety (Behaviour-based safety) Human Factors Approach Risk management procedures
1990	Organizational culture Mine Health and Safety Act (MHSA) Hazard identification and risk assessment (HIRA)
2000	Self assessment Risk Based Safety

\* Based on conclusions of Herbert William Heinrich, an American industrial safety pioneer, that 88% of all workplace accidents, injuries, illnesses are caused by 'man-failure' (Wikipedia, 2011).

(Source: Adapted from Smith & Mulder, 2004: slide 5)

The table is useful in understanding the origins of current policy and approaches.

(3) In respect of every employee, the provisions of subsection (2) must be complied with:

- (a) before that employee first starts work;
- (b) at intervals determined by the manager after consulting the health and safety committee;
- (c) before significant changes are introduced to procedures, mining and ventilation layouts, mining methods, plant or equipment and material; and
- (d) before significant changes are made to the nature of that employee's occupation or work.

(Source: MHSA, Chapter 2, Section 10)

Smith and Mulder (2004) go on to suggest that the eras of mine safety can be defined by three main trends: 'Firstly engineers tried to create a foolproof mine design; then engineers developed and improved operational procedures and processes and trainers developed skills; and finally psychologists tried to shape the behaviour of people (*ibid*: slide 6).'<sup>29</sup> This comment may be a little flippant but does indicate the uncertain role and status of training or preparing workers for workplace hazards in any approach or indeed in the total H&S system. The logic behind mine H&S training is not explained in the literature sourced, but I attempt to identify main ideas and trends.

The training logic of the Leon commission and the current MHSA involves three main facets or approaches to H&S training provision. Firstly, workers should be trained to execute *particular operations* in ways that combine self-protection with the avoidance of risks to fellow workers and others who may be affected, including the general public (Leon et al., 1994:71; MQA, 2011:31; MHSA, 1996<sup>30</sup>). Secondly, induction and refresher training should be designed for all ranks of mine officials, focussing on the problems that represent the greatest risk to health and safety (Leon et al., 1994: 168-169; MHSA, 1996<sup>31</sup>). Thirdly, *adult education or ABET*, is a primary intervention for H&S in the mining industry (Leon et al., 1994:168; Reichardt, 2010:62; MQA, 2011:31). This chapter reviews evidence of the logic of H&S training and evidence of implementation to address all three facets or approaches. Apart from the MHSA, negotiations and agreements are ongoing among the tripartite partners in the sector, including the H&S milestones and targets of the 2008 Tripartite Action Plan on H&S mentioned in Chapter 2.

<sup>29</sup> Despite numerous attempts to contact the authors of this presentation and their parent company for a written paper, I never received a reply. I could not find similar information in another source.

<sup>30</sup>MHSA, Chapter 2, Section 10:

(1) As far as is reasonably practicable, every manager must -  
(a) provide employees with any information, instruction, training or supervision that is necessary to enable them to perform their work safely and without risk to health.

<sup>31</sup>(2) As far as is reasonably practicable, every manager must ensure that every employee is properly trained -

(a) to deal with every risk to the employee's health or safety  
(b) in the measures necessary to eliminate, control and minimize those risks to health or safety.

The Tripartite Action Plan has elements that relate to training of workers, such as the intention to train 40 000 H&S representatives over the next five years, and the promotion of learning from best mining practices (COM, 2010:129).

### ***Mining Qualifications Authority (MQA)***

The MQA is the sector education and training authority (SETA) for the mining and minerals sector. The MQA was established in 1998 under the auspices of the Department of Labour. Since November 2009, the MQA and other SETAs in South Africa report to the newly-established Department of Higher Education and Training (Presidential Proclamations 44 and 531 of 2009). The Skills Development Act 97 of 1998 provides for a levy-grant scheme, whereby training levies are paid by employers in order to fund SETAs. These authorities then administer funds, manage the skills development process within the sector, and disburse funds to employers and other vendors of education and training. During the 2009/10 financial year, MQA revenue was R576 million; of this, following a surplus the previous year, R566 million was disbursed to mandatory and discretionary projects (MQA, 2010:86). One of the discretionary allocations of the MQA, made during the year, was R24 million for its occupational H&S programme (*ibid*:87). Furthermore, each year, mining employers are compelled to spend a percentage of their wage bill (apart from the skills levy) on skills development, the target rising from 3% in 2010 to 5% in 2014 (MQA, 2011:34). The MQA oversees and accredits nationally recognized qualifications, skills programmes and short courses.<sup>32</sup> H&S is a stated policy priority:

The MQA was established in order to improve health and safety standards through education and training in the mining sector. ...The legislative arrangements impose on the MQA a legislated responsibility to place health and safety at the centre of its focus and skills development activities (MQA, 2011: xvii).

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<sup>32</sup>A *skills programme* is a registered, occupationally-directed programme designed to constitute credits towards full qualifications, ensure competence in compliance with legislation, provide employable skills, and address identified skills needs of the industry.

A *short course* is a short learning programme through which a learner may or may not be awarded credits. Short course providers can qualify for skills levy grants, as long as the provision is properly documented in workplace skills plans and submissions.  
(Source: SAQA, 2011:n.p.)

### ***Competing policies and priorities***

The work of the MSA is subject to compliance with legislation and policies additional to the MHSA. These include the Mining Charter (the Charter), the National Skills Development Strategy III (NSDS), the Government's Medium Term Strategic Framework policy objectives, and the Presidential Outcomes for the Minister of Mineral Resources and the Minister of Higher Education and Training (MSA, 2011:124-126).

Although other statutes apply, the following discussion is restricted to the Charter and the NSDS III.<sup>33</sup> In October 2002, a Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry (the Charter) was accepted by stakeholders from state, labour and business. The Charter advocates a range of transformation commitments for the sector, but a recent assessment by the Department of Minerals Resources (DMR) revealed 'a number of shortcomings in the manner in which the mining industry has implemented various elements of the Charter' (DMR, 2010:i). Consequently, the Charter was updated in 2009 and certain commitments prioritized, mainly with regard to structural changes in the sector.<sup>34</sup> The MSA has responded to the Charter in its priorities and programme planning (MSA, 2011:33-35).

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<sup>33</sup> According to the MSA annual report, its legislative mandate includes:

Mine Health and Safety Act (No. 29 of 1996);  
Skills Development Act (No. 97 of 1998);  
South African Qualifications Authority Act (No. 58 of 1995);  
Minerals and Petroleum Resources Development Act (Act 28 of 2002)  
(Source: MSA, 2010:4).

<sup>34</sup> The main Mining Charter commitments are:

- transfer of ownership of mine assets to historically disadvantaged South Africans (HDSA);
- procurement of goods and services from BEE entities;
- employment equity in terms of management appointments;
- beneficiation of minerals;
- human resource development, which requires investment by mining companies of a percentage of the annual payroll in skills development (excluding the mandatory skills levy);
- mine community development;
- housing and living conditions of mineworkers

(Source: DMR, 2010:1-4).

MQA commitments in relation to the Charter are stated as: skills audits across the sector; ownership of mines; employment equity of managers; the investment by mining companies of a percentage of the annual payroll in skills development (excluding the mandatory skills levy); and sustainable development and growth of the mining industry (*ibid*: 33-35). These commitments do not overtly prioritize H&S, although ‘Charter requirements underscore the importance of health and safety in the skills development agenda’ (MQA, 2011:35).

The NSDS III was produced by the Department of Higher Education and Training (DHET) in 2010 and finalized in 2011. The overall purpose of NSDS III is outlined below:

The key driving force of this strategy is improving the effectiveness and efficiency of the skills development system. This strategy represents an explicit commitment to encouraging the linking of skills development to career paths, career development and promoting sustainable employment and in-work progression (DHET, 2011:5).

The consequent skills development priorities of the MQA for the current planning period are listed as:

- Support transformation of the sector through skills development;
- Support objective decision making for skills development through research in the sector;
- Enhance information management for skills development in the sector;
- Facilitate and support the development and implementation of core skills development programmes aligned with the sector qualifications framework; and
- Enhance the monitoring, evaluation and review of the delivery capacity and quality of skills development in the sector (MQA, 2011:129).

Such skills development priorities may align with the overall purpose of NSDS III, that of effectiveness and efficiency of training, but again do not place precedence on H&S. Clearly, the priorities of the sector have been supplemented since the MHSA was drafted in 1996.

Where there is evidence of prioritization in relevant documents, this appears to be in chapters devoted to compliance with the Mining Charter (MQA, 2011:104-113) and the NSDS III (*ibid*:113-123), with H&S often embodied as an underlying value, rather than an overt programming objective. The situation is reminiscent of the politics of school reform, where implementation of reforms suffers under ‘policy churn’. Problems and targets are identified and agreed upon by stakeholders and more policies are formulated, but in essence the stakeholders have really only agreed on the problems, rather than on plans for implementation (Marschall & Shah, 2005:172). In a situation where officials are placed under tremendous pressure to produce short-term results, a policy is better than nothing (Hess, 1999:7). Without widespread access to mines or to restricted data bases, it is not possible to assess what training actually happens. The public documentation of the sector suggests that the H&S priority may have been weakened by agencies being required to comply with many diverse policies, with the menu of policies enabling a bias towards those who are amenable to demonstrating compliance; there may also be a bias in the structure of reports.

### **5.3 Public evidence of training**

#### *Challenges*

The custodians of H&S training are diverse and non-standard, and in spite of legislation, practice is largely unregulated. ‘Most interventions are at individual company level with advocacy and some projects at the tripartite and Chamber levels’ (COM, 2010:103). Literature of a technical nature regarding the use of specific equipment for H&S can be found, but there is much less about training approaches and techniques. The restricted access and limited information are reported by other researchers, who explain that: ‘Historically it was claimed that training was not really a contributing factor regarding accidents and that a lack of training was not one of the most common causes for accidents or health related incidents on mines’ (Webber, Youngman & van Wyk, 2009:323). Mining companies are viewed as ‘reluctant to share information that can impact on their place in the market’ (Frankel, 2010: xv). The role of the state, as represented by the Department of Minerals and Energy (DME), is to monitor, audit and enforce compliance, but there is a dire shortage of the personnel needed to do so (DME, 2010:66).

Ultimately, the official body most responsible for H&S training in the sector is the Mining Qualifications Authority (MQA); hence the MQA publications are dealt with in detail.

### ***Compliance with the MHSA***

Compliance with training sections of the MHSA appears to be variable, but inadequate across the sector. Evidence reveals that very little of this training is done, and where it is done it is not documented (DME, 2008:37). There is even less evidence of training on small mines (*ibid*:64); less than 50% of small-scale mines surveyed had a structured training programme for employees (Dias et al., 2007:8).

The main findings of the Presidential Audit on mine H&S training were:

- There was generally poor provision of occupational health and safety training.
- Some of the mines did not have accredited training providers.
- There was a lack of training on hazard identification and risk assessment.
- On-the-job training was not done by most of the mines (DME, 2008:63).

Independent research supports these observations: ‘Far less training takes place than is anticipated by Section 10 of the MHSA. The quality of material provided by some in-house mining departments is also very poor when it comes to encouraging safe practices and the training staff are often poorly motivated’ (Frankel, 2010: 44). An explanation for the policy-practice divide has been offered by legal analysts:

The path-breaking provisions of the Mine Health and Safety Act set the standard for health and safety legislation in South Africa, but have proven difficult to implement. There is a huge gap between reactive, prescriptive and command-driven approaches to health and safety, and approaches which are proactive, best practice-seeking and inclusive (Masilo & Rautenbach, 2008:v).

### ***Task- and operator-focused training***

As stated above, one aspect of H&S training is to provide workers with training to execute particular operations in ways that enable them to work without risk to their own H&S, or that of others. This approach has shown the most evidence of progress in dealing with H&S limitations.

The MSA has facilitated the production of extensive qualifications and 140 skills programmes (MSA, 2011:87-88), and has assisted in the development of associated national unit standards. These are far too numerous to analyse here, but relate to the mining activities of many workers, such as explosives handlers, blasters, drillers, winch operators, drivers, and shaft sinkers. Many of the relevant unit standards on the MSA and South African Qualifications Authority (SAQA) websites contain assessment criteria relating to safe operations and a healthy environment. H&S components are also included in skills programmes designed for particular operators. In 2009, the MSA undertook a research project in which a selection of MSA qualifications was evaluated in terms of their coverage of the relevant health and safety issues (MSA, 2011:31).<sup>35</sup>

### ***Induction and in-service training***

The training of elementary workers, machinery operators and drivers is primarily the responsibility of employers, since these workers generally do not have adequate formal schooling to be eligible for accredited skills courses and qualifications at NQF Level 1, equivalent to about Grade 9. ‘These categories of workers are typically trained for their specific positions after entering into employment contracts’ (MSA, 2011:74).

The scope and intensity of training for novice miners, refresher courses when mine workers return from periodic leave, and other programmes to maintain a focus on safety is far less substantial than the many months basic and continuous training given to, for example, British miners’ (Frankel, 2010:44).

Induction and refresher training are largely left to the discretion of employers who make use of their own training sections or contract providers. ‘The quality and extent of training is left to be determined by each mine, mining group, or by mine management intent on making workers production able as soon as possible’ (*ibid*:44).

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<sup>35</sup> I requested this report (EE Focus Report) from the MSA on 21 June 2011, but it was not made available to me, as quoting from the document is not permitted.

The MSA does not provide employers with any guidelines regarding H&S training for the induction of new recruits to mining, or any other underground workers (de Leeuw, 2011: Personal communication). Some information on in-house H&S programmes can be accessed via their advertising on the internet. My searches of programmes on offer reveal that many are targeted at managers rather than underground workers, and are designed to assist employers in understanding and implementing the basic requirements of the legislation. Recently, due to pressure to comply with the MSA, more training vendors advertise H&S programmes for mineworkers. However, the actual programme outlines reveal that many do not relate specifically to mining, but are about generic H&S, such as physical fitness, fire fighting and first-aid.

### ***Dedicated H&S training***

Evidence of dedicated H&S training for mineworkers, focussed specifically on problems that represent the greatest risk to health and safety, is limited. This observation is supported by others: 'MSA training in the specifics of safety and health, as opposed to technical training, is still fairly poor at all levels' (Frankel, 2010:45). 'Health and safety as a subject has not been adequately addressed like the technical subjects' (DME, 2008:39). The most recent annual report of the MSA refers to only one detailed record of dedicated H&S training for the period 2009-2010, a skills programme for H&S representatives (MSA, 2010:53). The proposed training is discussed further in Chapter 6. It is not possible to ascertain how many mineworkers may have been enrolled on other MSA-supported H&S programmes, since such information is not published in the annual report, though it may be available on a restricted access data base (MSA-I-Share). Since its inception, part of the brief of the MSA has been to monitor and alleviate skills shortages in the sector (MSA, 2011:89). As stated in Chapter 1, the categories of workers forming the primary focus of this study, elementary workers, machinery operators and drivers, suffer injury and ill health: 'These occupations experience a high replacement demand due to mortality related to occupational and other diseases, and accidents on duty' (MSA, 2011:102). This is a researched trend in the sector, yet occupational H&S is not substantially evident in public reporting of training programmes, even if HIV is a contributing factor.

Lung disease kills many times more mineworkers than accidents each year, and the mining industry is experiencing its worst TB epidemic ever, yet evidence of programmes or guidelines on lung health for new recruits or any other mineworkers could not be found. This may be due to the occupational bias of training and the logic of attaching H&S to operator training. In terms of complying with the MHSA, there is no convincing evidence that every employee is being trained to deal with the biggest threat of all, lung disease. This observation is supported by Calver (2008:26), who states that ‘Many employees have little or no understanding of the processes that lead to occupational lung disease, their consequences, how to protect themselves from the conditions.’ More specific information on addressing lung health is presented in Chapter 6 on health communication.

## 5.4 Education and H&S

### *Under-education*

In 1994, the Leon Commission identified the general levels of education of mineworkers as ‘woefully inadequate for this multi-million rand enterprise’ (Leon et al., 1994:70).

Managers who are working for mining companies in more developed countries cannot comprehend fully the difficulties under which their South African counterparts have to labour to run their mines and try to maintain an acceptable level of health and safety. ...Even symbolic communication is difficult when there is a large difference in cultural background between those who wish to communicate (Leon et al., 1994:70).

The Leon Commission advocated adult education and recommended that `all mining companies move forward the national initiative in adult education with a view to improving communication in mines, which will in turn result in improved health and safety’ (Leon et al., 1994: 168). In 2008, 14 years later, the Presidential Audit made the same sort of observation:

Most of the mining workforce lack basic literacy and numeric skills and a lack of literacy renders written communication with most of the workforce impossible... South Africa's standard of education in the mining industry is on average several years behind that of the developed world with our similar mining economic structure (DME, 2008:36-37).

The same kind of logic is still evident in some mining publications. The conflation of literacy, English language skills and a common language of communication into a single problem of worker under-education continues. In fact, it is regarded as inhibiting the thought processes of the workforce in relation to H&S, as seen in the extract below:

Perhaps the most fundamental constraint is that of poor education and literacy in the workforce. This hampers not only workers' ability for advancement, but also affects their ability to benefit from training and awareness initiatives. Sixteen years later, many of the fundamental problems remain in place. A large proportion of the labour pool still enters the economy with weak or incomplete literacy and numeracy skills. A workforce that is able to absorb the importance of corrective actions and safety initiatives requires such skills. Three-dimensional thinking and clear communication of sometimes complex measures are required if safety initiatives are to gain traction (Reichardt, 2010:62).

Current documentation of the mining sector still suggests that literacy instruction and ABET are the most relevant training interventions for H&S: 'The MQA was specifically tasked with the improvement of the Occupational Health and Safety (OHS) skills capacity in the industry, by reducing the rate of illiteracy and increasing the human resources supply in scarce skills areas that are critical to OHS' (MQA, 2011:31).

DMR completed audits on 250 of about 333 high-risk mines and in its report it identifies numeracy and literacy as fundamental requirements for skills transfer and maintains that the lack of these skills among nearly one quarter of the employees is an obstacle to communication and effective health and safety training (ibid: 31).

### ***Formal education of mineworkers***

The origins of the low levels of education of South African mineworkers are not dealt with here, other than to acknowledge the obvious historical ties to racial and political inequalities, disparities in resource allocation, poverty in the southern African region, and unresolved problems in the delivery of schooling. Underground mine work is also physically demanding and tends to provide employment to people who cannot find other occupations because of their lack of formal education. The Mining Qualifications Authority (MQA) has recorded the formal educational levels of workers across the mining industry.

<b>Table 14: Formal education of employees in the mining sector</b>		
<b>Year</b>	<b>2002</b>	<b>2009</b>
No Schooling	16.3 %	15.4%
Pre-ABET	2.8	3.0
STD 1/ Grade 3/ ABET 1	12.3	5.0
STD 2/ Grade 4	7.0	4.1
STD 3/ Grade 5/ ABET 2	6.7	4.6
STD 4/ Grade 6	6.0	4.9
STD 5/ Grade 7/ ABET 3	8.2	6.9
STD 6/ Grade 8	6.9	5.0
<b>Sub-total</b>	<b>66.2</b>	<b>48.9</b>
STD 7/ Grade 9/ ABET 4/ NQF 1	5.6	6.1
STD 8/ Grade 10	7.9	8.2
STD 9/ Grade 11	4.4	7.8
Matric/ Grade 12/ NQF 4	11.5	19.5
Post-school Qualifications	4.5	9.5
<b>Total</b>	<b>100 %</b>	<b>100 %</b>

(Source: MQA, 2011:16)

This provides an uncertain scaffolding of foundational educational skills for further training:

- 15.4 % of all mineworkers never attended school at all.
- 37% of mineworkers did not complete primary school.
- 48.9% of all mineworkers left school before a level equivalent to NQF 1 (Grade 9 or ABET 4) and consequently lack the educational scaffolding for registered qualifications and skills programmes in mining or other employment sectors.
- 71% of all employees did not complete their schooling, but this figure is estimated at 80% for underground workers (DME, 2008:35).

The CEO of the MSA has said that more than 67% of mineworkers are illiterate (Chilwane, 2009:n.p.). This makes sense, given that the educational standard used to estimate literacy rates is arbitrary; some adults forget what they learned at school, especially if they were exposed to very little or poor quality schooling, while others advance their school-based learning, particularly if they operate in highly literate or numerate environments as adults. As Rule (2006:115) states: ‘Because of the appalling standard of apartheid schooling, and the continuing dysfunction of schools in the democratic era, many adult learners who have nine years of schooling still require basic education.’ Clearly, most workers in the mining industry are candidates for compensatory adult education, i.e. education intended to compensate those who were deprived of part or all of the education they would normally have received during the period of compulsory schooling. The mining industry has two possible responses to under-education: to employ only workers with school-leaving certificates, which may result in labour disputes, or to provide compensatory adult education. Some mines, especially the relatively more mechanized coal mines employ only workers, who have completed formal schooling (Grade 12), but this is not a publicly stated policy; it just happens.

### ***The ABET response***

The provision of compensatory ABET is a strategic programme of the MSA, though enrolment has declined in the sector over the past five years. In 2005, submissions to the MSA from mines set ABET numbers at 20 339 (MSA, 2006:59).

Problems with implementation appear to be the major barrier, followed by the limited prospect of reward in terms of further career or employment opportunities. The most recent programme results are:

<b>Table 15: ABET in the mining sector 2009-1010</b>		
<b>No. Workers</b>	<b>Enrolled</b>	<b>Completed</b>
Level 4	1 668	519
Level 3	3 527	1 288
Level 2	3 966	1 577
Level 1	4 769	1 687
<b>Total</b>	<b>13 930</b>	<b>5 071</b>

(Source: MSA, 2010: 24)

ABET in the mining sector faces more implementation challenges than in other industrial sectors in South Africa because of the complications of releasing workers at consistent times during shift changes. The physical demands of mining also result in workers being too tired to concentrate after their shift. Block release programmes are usually more successful in local industry, but workers may then have to forgo earning overtime bonuses during that period. These financial implications are critical for workers, but are not managed consistently in the industry. ‘It is clear from the data that it is the larger companies that can afford to be more generous with regard to fully paid (including bonuses) full-time ABET programmes’ (MSA, 2006:59). There is also no evidence of long-term reward for ABET: ‘While companies are quite positive about the available career-pathing and counselling systems in place, union representatives and employees are quite negative about the systems (or lack thereof) for guidance, counselling and the provision of information on opportunities, etc.’ (MSA, 2006:51). In 1987, David Brown conducted a study of literacy and language on the gold mines. He reported that there was no direct relationship at the time between leadership amongst unskilled workers and levels of literacy, i.e. no correlation with appointment to menial work or as team leader, and that the majority of people who went to literacy classes did not get promotion (Brown, 1987:12-15).

Currently, the MSA reports that ‘the issue is improving with a mix of formal and informal advising on further opportunities,’ and that the responsibility for these functions is located differently at different mines (MSA, 2006:61). There are other pertinent issues. Many mines do not offer ABET 4, and employees expressed some lack of motivation to enrol, as their educational upward mobility was capped at a particular point (MSA, 2006:59). Finally, experiences in other companies in South Africa have shown that advocacy and marketing of ABET have to be especially sensitive in large communities of men, many of whom may have been through intense manhood rituals and consciously put aside ‘things of childhood,’ such as schooling. The programme cannot simply be depicted as a return to school. The issue of the masculine identities of mineworkers was discussed in Chapter 2, but I have not found references to this question in relation to ABET in the mining sector.

### ***Impact of ABET***

The MSA investigated the impact of ABET on H&S in the sector, which was found to be positive, but with a qualification: ‘A common perception exists that ABET contributes to improved health and safety, but it is not possible to make this link quantitatively through data’ (MSA, 2006:56). The MSA study treats ABET as a single holistic process and does not subject it to analysis of component variables and differentials (*ibid*:17-20).<sup>36</sup> I have tried to further explore the reported connection between ABET and H&S. The three sources of effect, improved *literacy*, enhanced *awareness of H&S issues*, and *self-concept*, are outlined below:

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<sup>36</sup> For example:

My MED. was a study of individual and organizational outcomes of ABET in a factory south of Johannesburg (Tuchten, 1997). Research participants were mainly migrant workers, having a social and educational background comparable to mineworkers. At the time, in the context, the findings suggested that there are some general trends that relate to ABET organization of levels and learning areas. Enhanced literacy and English communication helped in the workplace with reading and communication, while numeracy had the most impact on better management of money (Tuchten, 1997:99-100).

ABET Level 1 (Grade 2/ basic literacy in the mother-tongue of the learner): increased self-esteem of individuals, improved morale in company, lower absenteeism.

ABET Level 2 (Grade 5/ post-literacy and English communication): communication in company improves, reporting of rejects improves, machine down-time better.

ABET Level 3 (Grade 7/ reading and writing English and more complex numeracy): workers take on new tasks and machines as they can read English and understand basic numeric conventions (Tuchten, 1997: 111-136).

*Improved literacy (mastery):*

Many reports mention that literacy improves safety in the workplace because employees can read and understand warning signs. ...ABET helps learners to read and understand: safety warnings; instructions; company briefings; and to communicate better (*ibid*: 46).

*An enhanced awareness of H&S issues (mastery):*

Almost all the mines commented that ABET employees are more aware of health and safety issues pertaining to the work place as well as the world in general... Employees are more aware of health issues, including HIV/AIDS, malaria and TB (*ibid*: 46).

*Self-concept:*

A universally acknowledged outcome of literacy and ABET is improved self-esteem. It can be a personally transformative experience, even when there are no economic or other gains. Any aspect of an adult's life that is difficult due to a lack of literacy, numeracy and English language skills, such as shopping, communication at work, organizing children's education, or reading out loud at church, would be enhanced by ABET. Consequently, H&S efficacy, as well as many other aspects of a worker's life, could be enhanced by the ABET process, especially if it were a positive experience, leading to enhanced self-esteem. This relates to 'self-concept', an accepted source of self-efficacy (Bandura, 1994:n.p.; Kear, 2000:2).

Furthermore, ABET practitioners generally aim to contextualize learning, so current safety, and especially health, issues would probably be discussed or read about in classes, enhancing participants' awareness and mastery of these subjects. ABET programmes in industry can be unique to the context, because adult educators have some exposure to AET traditions and concepts such as 'learner-centeredness', as compared with trainers and line managers. An ABET class may tend much more to a *dialogic space* than other industrial settings, allowing H&S issues to be interrogated with candour and validity, facilitating enhanced engagement and efficacy. However, the low showing of ABET indicates that it is necessary to facilitate comparable awareness and mastery of H&S subjects outside of ABET structures.

In terms of *scale*, the mining industry currently employs approximately 548 000 people (MQA, 2011:10), most of whom are elementary workers, drivers and machine operators, the categories which would be exposed to most danger underground and least formally educated. Graduates of all ABET levels, taken together without information about the number of subjects involved, amount to just over 5000 per year. Numerically, this is a very small proportion of the target employees. The ABET initiative is both too small in scale and too slow to have a definitive effect on H&S in the mining sector. Compensatory ABET is a constitutional right. Good quality ABET has tremendous potential for fast-tracking talented individuals and for compensating people who want a second chance at education. Not every adult worker, however, will have such an inclination. The recommendation of the Leon Commission regarding adult education as a primary intervention for improved H&S has not proved to be a feasible policy for widespread H&S advocacy or training. The diminishing impact of ABET on H&S over the past 17 years, reaching its present low level, supports a case for urgent alternative and additional interventions.

## 5.5 Language issues

### *Communication*

The Leon Commission also suggested change in the mining sector in terms of language and communication (Leon et al., 1994:168). Since the employment of migrant workers in the 1900s, the accepted lingua franca of the sector has been a local pidgin language known as Fanakalo (or Fanagalo). ‘The safe and healthy operation of the industry depends, *inter alia*, on effective communication. The lack of common communication undermines the efficiency of oral communication and has a negative effect on skills development’ (DME, 2008:36-37). Over time this suggestion has become an unfulfilled quest for a single, suitable language for the sector. Communication in the mining sector is complicated by the following factors:

- Mineworkers use many different languages, at least 13.
- Many workers do not speak English.
- Most mine personnel still use the lingua franca of Fanakalo.
- Some stakeholders criticize Fanakalo as being both limited in its expressive capability and offensive.

To date, a clear and constructive language policy continues to evade the mining industry, and especially the training departments. Current language policy for the industry veers between English and multilingualism. ‘If Fanakalo is phased out one solution is to substitute it with English, the other is to encourage and promote multilingualism in the industry’ (Diliza, 2009: 1). A review of the MSA language policy is under way (MSA, 2011:30), but the Chamber of Mines has not formulated a language policy to date.

### ***Fanakalo***

Fanakalo is described as a pidgin language that consists of about 2000 words, about 70% of which are based on the Zulu language. Put simply, a pidgin language has simpler structures and is less developed than a creole. Fanakalo is still widely used in the mining industry and other sectors, but is thought to have origins in the KwaZulu Natal sugar farms or in interaction between missionaries, farmers, traders and residents of KwaZulu Natal and the Free State regions (Allman, 2009:31; Oosthuizen, 2008/9:42). Although Fanakalo is classified as a pidgin, it has qualities that differentiate it from classical pidgins. For example, the European language is usually the target language, but in the case of Fanakalo the indigenous language, Zulu, was the target language that the European settlers tried to learn (Oosthuizen, 2009:42). The word Fanakalo probably originated in a translation of *enza fanaka lo*, which means ‘do it like this.’ As is the case with most creole and pidgin languages, Fanakalo developed in a context of disparity of power and resources. It is often described in very negative terms, as in the following quotations: ‘South Africans, though, view the language, as an entity, with disdain, despite its continued use, due to its symbolization of social hierarchies and the apartheid era’ (Allman, 2009:31); it is ‘a language of command and carries connotations of boss-servant relationships’ (Block, 1998:A1); it is ‘designed to drive people at work’ (Moodie, 1994:102); and is, ‘in essence, a language of instruction’ (Oosthuizen, 2008/9:42). The language is also said to be limited in its functionality, ‘with little subtlety and no nuance’ (Moodie, 1994:102); it ‘has a very limited vocabulary and is unable to convey subtle meaning’ (Oosthuizen, 2009:42); and is ‘inadequate to convey the nature and extent of the dangers in the occupation of mining’ (DME, 2008:36). A mining publication describes attempts to change language use in mining as follows:

I am aware of numerous attempts to stamp out Fanakalo in the past by various mining houses, but this is the first time that such a comprehensive solution is being sought and is being enacted. We know we have a solid working model that will finally release mining from the shackles of Fanakalo (Mining Africa Yearbook, 2008: 2).

The quotes above demonstrate the kind of invective that has been attached to language debates in the sector. The expressive limitations of Fanakalo have not been studied, but it seems questionable to state that people are unable to express themselves in pidgin or creole languages, which are usually flexible in terms of developing new vocabularies and registers. Motsaathebe (2010:105) describes Fanakalo as wide-ranging and ‘utilised by many artists especially novelists and playwrights.’ During the 1980s, white Portuguese-speaking miners, if unable to speak English or Afrikaans, were allowed to take their examinations for blasting and supervisor certificates in Fanakalo (Brown, 1987:4). More recently, it has been advocated that ‘a common language such as Fanakalo could potentially be developed, studied, and used as a common language across the continent’ (Motsaathebe, 2010:98). Much intense advocacy work is being carried out on behalf of indigenous pidgin and creole languages all over the world. It would be unthinkable to describe other pidgin and creole languages in the pejorative terms used for Fanakalo, often by academics who themselves do not use the language. The history of Fanakalo under apartheid raises questions about how such debates can be manipulated for and against skills development and the degree of caution required. Brown (1987:7) argues that negative opinions of Fanakalo perpetrated by linguistic academics suited apartheid ideologues and militated against it acquiring the status of a language. ‘The majority of workers came from ‘homeland’ areas, whose sense of national identity [they] wished to promote,’ and officially maintaining separate ethno-linguistic groups ‘promoted this desired sense of nationalism’ (*ibid*: 7). Maintaining the uncertain status of Fanakalo helped to prevent it from receiving equal status with the official languages (English and Afrikaans) for the purpose of training skilled labour, entrenching the situation that remains today, where blasting examinations must be taken in English or Afrikaans (*ibid*:7).

### ***Language policy***

Language policy for training remains unresolved. A reading of local in-house reports of training activities reveals that trainers often default to the use of Fanakalo. However, as Fanakalo is not one of South Africa's 11 official languages, its mandatory use in the workplace or in training may not align with national or sectoral language and training policies. In turn, this could impede access to funds provided to employers for training by the South African government via the sector education and training authorities (SETAs). However, the call to replace Fanakalo with English is proving difficult:

In this context, the politically motivated removal of the mine language Fanakalo has not helped. There is no question that Fanakalo is a command language, lacking subtlety or respect for people. However, being part of the induction process, the language formed a common medium of communication that allowed all levels of the workforce to interact and communicate at the rock face, irrespective of their background and skills levels. Given the high levels of illiteracy persisting among the mining workforce, English could not automatically take Fanakalo's place at the rock face, despite the demands of politicians that it should (Reichardt, 2010:62).

The many mineworkers who do not speak English would take many years to master it with confidence, as they have little time for part-time study, which often clashes with shift work and overtime employment opportunities. Mineworkers have relatively few opportunities to practice and reinforce new language skills, as they do not use English socially and mining is a largely physical occupation in a noisy environment that does not encourage conversation, especially as workers are encouraged to use ear protection. The extremely negative critique of Fanakalo, one of the assured abilities of these workers, simply undermines them personally and professionally. I could find only one serious attempt to study mineworkers' attitudes to its continued use. A survey of workers conducted in the Anglo Platinum operations, revealed that more than 60% of the workers would support the banning of Fanakalo in their place of work.

As research conducted among some 6000 employees revealed, most employees agreed that a change in Angloplat's language policy would improve understanding among employees and enhance work place safety. The aim is to provide for an operational level of communication proficiency, rather than to enable literacy and fluency (Mining Africa Yearbook, 2008:1).

I was unable to access the actual research report, but found an article on the study and spoke to the senior researcher involved. The findings of the study were that the mineworkers elected to use one of their local languages (Setswana or sePedi) over the Zulu-based Fanakalo, rather than English, as the dominant medium of communication in the workplace, though they regarded English as extremely desirable (Thwala, 2009: Personal communication). This made sense, as the mining press articles I had read suggested that the Anglo Platinum workers had rejected Fanakalo in favour of English as the language of the workplace. This would have been a form of professional suicide for many older workers. Reflecting on the study and his linguistic research experience, the researcher said that these findings were specific to the locality in which the study was conducted, the platinum mines of the North West Province, and should not be generalized across the mining industry. He anticipated that the findings might be different in the gold mining areas of Gauteng, where Zulu, as well as other languages, was more often used (*ibid*). The increasing use of contract workers also affects language and training policies:

Contract workers do not usually reside in one mining operation for a long time. It is therefore difficult to make them part of a specific mine culture. Furthermore, contract workers are usually from different parts of the country and they often speak different languages. Their lingua franca is in most cases Fanakalo. Requiring them to adapt to the language policies of particular mining operations may prove very difficult indeed (Thwala, 2008: n.p.).

Policy directives generally take the form of a choice of language. A more functional approach may be a process of real research and engagement with language practices, though the MSA is currently conducting research into language use on mines (MSA, 2010:37).

The interface between English and Fanakalo (or any other local language) could be interrogated in a more positive way, rather than presenting them as dire alternatives, and policies of localized bilingualism could be considered. Optimal learning opportunities should be provided for those mineworkers who wish to learn English and fast-track their career development, but acquiring a language for simple oral communication and using that language as a medium for new learning and advancement requires different interventions. Short-term English language instruction, confused with literacy, seems to have had little effect since the Leon Commission in 1994 in changing language practices in mining, or in enhancing health and safety.

## 5.6 H&S culture

### *Introduction*

The three broad approaches to H&S training, making operations safe, focusing on H&S issues, and ABET, have been reviewed. More recently, research and negotiations in the mining sector have revealed consensus about a weak H&S culture<sup>37</sup> (MQA, 2011:31; COM, 2010:129; DME, 2010:126; Hill & Pitzer, 2005:3). The 2008 Tripartite Action Plan on Health and Safety proposed the implementation of a culture transformation framework, after research indicated that OHS culture in South Africa was significantly more negative than in other mining countries, and the Mine Health and Safety Council (MHSC) is currently conducting research into a ‘culture transformation framework’ for the sector (DME, 2010:126).

### *South African mining*

One of the most influential ‘culture’ studies, the Safemap report (Hill & Pitzer, 2005), reported many indicators of H&S culture in which South Africa is rated lower than Australia and other international benchmarks. Examples of these follow.

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<sup>37</sup> Safety culture refers to shared values and beliefs, those things that are regarded as important in the company, and how they translate into the actions and behaviours of people; characteristics that are the collective behaviours of people in the organization, that over time become patterns (Hill & Pitzer, 2005:5-6).

Trust shows a significantly negative trend in the research. Trust and loyalty to the employer are significantly lower than international benchmarks, and even managers express an extremely low level of trust for their management (Hill & Pitzer, 2005:27-28). Low levels of trust and a poor relationship (regarding safety and otherwise) between employees and their immediate supervisors are also reported, with employees perceiving that their immediate supervisors do not genuinely care about safety (ibid:27). A difference between espoused safety and the application of the safety systems and rules demonstrates ‘a high level of non-compliance of safety standards’ (ibid:28). The Safemap report recommended a shift away from compliance towards an enhanced H&S culture, suggesting that ‘the local mining industry move beyond compliance and systems as a driver of H&S as this may be inhibiting the industry in moving to the next level of developing a more positive safety culture’ (Hill & Pitzer, 2005:33). Research has found that the imposition of standards facilitates a culture of blame, especially when adherence to standards conflicts with the responses workers make to achieve production targets, yet infringements of rules and regulations are met with institutionally sanctioned penalties (Phakathi, 2006:13). A shift away from compliance is valuable, because it focuses on efficacy, rather than a kind of rehabilitation of elementary workers, but requires the input of mastery: ‘This approach will require that employees at all levels become more competent in the understanding and managing of risks, rather than relying on the prescribed rules and procedures’ (Hill & Pitzer, 2005:34). It also builds on a *positive* finding of the Safemap report, one that drew little comment. Compared to relatively low international benchmarks, there is an indication that there is a culture of ‘self-preservation’ among local mineworkers (Hill & Pitzer, 2005:28). This is a positive base for facilitating more substantial self- and collective efficacy for health and safety. As stated before in this review, there are many aspects of mineworkers’ complex lives in which they demonstrate great self-efficacy.

### ***Modifying H&S culture***

The H&S cultures of individual mines are not distinct from holistic mine or organizational cultures and are dependent on working conditions and morale, i.e. employees being satisfied with their jobs, perceiving that their supervisors are supportive and considerate, and believing that they are treated fairly by the organization (Jansen & Brent, 2005:725).

It is a challenge to consider how such cultures would be amenable to training. Initiatives in companies with the resources to attempt culture change have been challenging:

Many multinational mining companies have found that the behaviour-based safety programmes, instituted among their workforces in countries such as South Africa, struggle as they seek to impose a safety behaviour culture at work that exceeds that of employees' everyday life experiences. This suggests that further advances in workplace safety will need to change very fundamental tenets of the workforce culture (Reichardt, 2010:63).

Yet the culture of large and complex organizations, even H&S culture, may not be amenable to interventions. A more defined focus on team culture may be more valid. As stated before, the interaction between workers, team leaders and immediate supervisors is critical to H&S behaviour, because immediate supervisors are clearly significant in the execution - or otherwise - of H&S practices underground. As with the overviews of mine H&S culture, some of the literature on team culture is also negative and speaks of a lack of trust (Hill & Pitzer, 2005:27) and intimidation, as presented below:

Many young miners are simply too intimidated to approach their older team leaders with information, no matter how intense their HIRA training, because they fear disrupting work that can cause economic loss in the form of a production bonus for the entire team. Others lack sufficient self autonomy to transgress patriarchal boundaries that elevate team leaders, miners, or shift bosses to near imperial status (Frankel, 2010:39).

However, a positive critique is emerging. Panels or work teams who work together underground can be sites of unique energy, ingenuity and loyalty. According to Campbell (1997:278), 'Much has been written about the creative and innovative way in which mine workers have responded to the alienation and danger of their working lives, constructing personally meaningful identities despite massive social constraints.' Researchers have found it difficult to quantify the effects of HIV on injury because of 'anecdotal reports that sick miners are sheltered from more arduous

tasks by their co-workers' (Murray, Sonnenberg, Nelson, Shearer, Bester, Begley & Glynn, 2005:2023).

Phakathi (2006) develops and advocates a *Planisa* (make a plan) model of training which builds on these positive aspects of work team culture and skill. He envisages an approach that grows up from the workplace, taking the 'view from below,' rather than attempting to create a 'new worker' from above (Phakathi, 2006:3):

There are two ways of thinking about the relationship between work and training. The first approach takes as its starting point the training needed to create a new worker for a putative new workplace. This is described as the *New Worker* model. The second approach starts from the actual workplace and elaborates pre-existing skills and knowledge (Phakathi, 2006:3).

'*Planisa* is a Fanakalo injunction, entreating miners to deploy their skills and ingenuity to tackle the day-to-day problems posed by the endemic uncertainties and organisational dysfunctions of mining' (ibid:14). It is 'part of the existing occupational culture of miners and an embryonic form of teamwork' (ibid:1). The unique challenges of South African mining, often used as a case for defending the poor H&S record, contribute to the formation of this culture:

The specificity of ultra-deep mining – depth, heat, the possibility of rock falls and seismic events – represents a unique, artificially created, total work environment. Workers learn to deal with the complex of uncertainties that characterise this environment and it is out of this scenario that their occupational culture is born (Phakathi, 2006:4).

Phakathi points out that management not only recognize *planisa* but consistently order workers to do so: 'In effect, workers are instructed to create their counter-plans to get things done. ...the challenge is to harness the capacities of miners to exercise these occupationally learned skills while eliminating the unsafe aspect' (ibid:14). The most frequently encountered issues requiring this kind of ingenuity, as recorded by Phakathi, were shortages of materials, breakdown of machinery, budgetary constraints, and the imposition of standards (ibid:12-13).

This type of deep contextual research indicates the realities and experiences of a shared culture and suggests curricular priorities for this target group of workers (*ibid*:15). Health promotion specialists Airihenbuwa and DeWitt Webster (2004:7) addressed the issue of negativity and suggested that a conscious goal is ‘to ensure that an intervention is developed with the idea of *not* only the bad in mind, but to also to promote the good and recognise the unique or indifferent aspects of culture.’ More genuine contextual inquiry of underground practices, good, bad and indifferent, could inform H&S training.

### ***Self- and team efficacy***

Team culture also relates logically to Bandura’s conception of *social persuasion* as a source of self-efficacy (Bandura, 1994:n.p.). The application of learning or technology transfer in the workplace is frequently cited as a problem in mining. The implementation of acquired technique and knowledge is also frequently eroded, if not neutralized, once the worker reaches the underground workplace, because of section, shaft or even team cultures, behaviours and short-cuts that have been sanctified over time (Frankel, 2010:45). A worker who acquires mastery of a task or H&S issue may have such efficacy subsequently undermined in the workplace by social persuasion of his/her peer group. ‘It is more difficult to instil a high belief of personal efficacy by social persuasion alone than to undermine it’ (Bandura, 1994:n.p.). Rather than grand designs of culture change, it may be functional to address sources of social persuasion at an underground team level, facilitating positive influence directly where efficacy is most vulnerable, at the interface between workers and team leaders. This would avoid placing workers ‘prematurely in situations where they are likely to fail’ (Bandura, 2004:622).

## **5.7 Other approaches**

This section attempts to identify more subtle approaches, as well as the most reported trends, for training the relevant group of workers. Sources include a mix of approaches, methods and modalities often described as solutions. The integration of these is often advocated (Venter, 2000:34-35; Frankel, 2010:85-93; Jansen & Brent, 2005:719), as is the use of a multi-disciplinary study applying ‘general principles derived from other industries’ (Willis & Hamilton-Attwell, 1998:1).

'The fact that human loss continues in the industry also indicates that no single correct health and safety method has been defined and no absolute consensus has been established' (Badenhorst, 2004:47).

### ***Hazard identification and risk assessment (HIRA)***

An approach that has gained acceptance in the legislated policy and subsequent training is an analytic process generally known as hazard identification and risk assessment (HIRA). 'Risk management processes are fundamental to the Mine Health and Safety Act and most other modern OHS statutes' (Hermanus, 2007:536). This approach is already used in other mining functions, such as assessing financial risk, equipment costs, world financial markets and commodity prices, and supply and demand. It is widely used across other sectors and disciplines as well. HIRA is basically a stage in the wider analytic and sometimes practical process of managing risks of any sort. Foster, Rose and Talbot (1998:334) state that there is an almost bewildering range of approaches and risk assessment techniques available to local mine H&S, but in essence they all contain the same fundamental steps:

- Identify hazards – something with the potential to cause harm.
- Assess the likelihood, or probability, of harm arising from the hazard.
- Assess the severity of harm resulting from realization of the hazard.
- Combine assessments of likelihood and severity to produce an assessment of risk.
- Use the assessment of risk as an aid to decision making.

(Foster et al., 1998:334).

The general complexity of HIRA models has inhibited implementation and training in the sector (Badenhorst, 2004:48; Hermanus, 2007:537; Foster et al., 333). However, the approach is useful in demonstrating compliance with legislation, as it 'also enables the employer to demonstrate readily, both to himself and to other persons, that all the factors pertinent to the activities have been considered, and that an informed and valid judgment has been reached about the risk posed by the hazards' (Badenhorst, 2004: 48). More recently, efforts have been made to extend the training offered to include elementary workers and H&S representatives, as well as managers and occupational hygienists.

'Most consultancies and training organizations now offer HIRA to front-line supervisors and operators with the consequence that relatively more people underground today know a hazard, or potential hazard, when they see one' (Frankel, 2010:37). Local mines have found it most functional to simplify and adapt the HIRA process to specific local conditions and H&S issues (Furter, 2007:5-16; Foster et al., 1998:337; Buys, 2006:30- 31; Stacey, 2009:291-292). Examples of local adaptations cited include applying the concept specifically to engineering design (Stacey, 2009:291-292), or inverting the process, i.e. analysing and ranking factors which increase risk rather than reducing it (Foster et al., 337). Another aspect has been the inclusion of behaviour-based safety (BBS) training methods in the approach. The phrase behaviour-based safety (BBS) refers to the use of applied behaviour analysis methods to achieve improvement in safety performance, i.e. analysis of specific incidents or at-risk behaviours in terms of the organizational structures and practices (Jansen & Brent, 2005:720-721). A local application of both risk assessment and BBS has been the introduction of a rotating safety 'pack' or group who 'stop and fix' problems underground and report valuable information, and of a reward scheme including badges, vouchers, and an electronic board displaying the names of current safety champions (Furter, 2007:15-16). However, these examples are really indicative of integrated and adapted approaches.

Clearly, HIRA has validity and could constitute one of the conceptual tools that make up the 'mastery' component of a self-efficacy approach. This approach tends to be applied more to safety than occupational health, for example, in relation to travel paths, heavy equipment, hazardous materials and explosives (Hermanus, 2007: 537), and does not always carry over into the workplace. 'The long line between identification of a hazard, a risk assessment and a mitigating behaviour is also punctuated by many variables reflecting the social psychology and power relations of those seeking to enhance safety performance' (Frankel, 2010:40).

### ***Computer-aided learning***

A current and recurring suggestion in the media and in more formal studies is the use of computer-aided learning for H&S training of mineworkers (Heyns, 2011; Creamer, 2011; Webber-Youngman & van Wyk, 2009; Squelch, 2001).

This is inevitable, as the use of computer-generated virtual-reality (VR) images is common in many hazardous sectors, such as aviation, the nuclear industry, the military and mechanized mining (Foster & Burton, 2004:129). The use of such technology has valid support in mining because it has unique applications; these include the rehearsal of certain operations, accident reconstruction, hazard recognition, creating a variety of scenarios, and simulating situations that would be dangerous in real life (Webber-Youngman & van Wyk, 2009:350-352; Foster & Burton, 2004:129). Engagement with such programmes by relatively uneducated workers is facilitated by the use of touch screens and joy sticks, rather than keyboards and alternative language options (Squelch, 2001:210; Webber-Youngman & van Wyk, 2009:353). Vendors of these programmes inform the press that this modality also reduces training times, cuts costs, reduces the number of training practitioners needed, builds confidence, facilitates leadership, develops pride, and offers multiple language options (Heyns, 2011:3-4). Large sections of the mining industry, including the powerful employers' organization the Chamber of Mines, have adopted the notion of 'high tech' and 'computer-aided techniques' as optimal for health and safety training (Creamer, 2011:n.p.; Naidoo, 2011:n.p.). The specific use of the technology in relation to occupational health and mine culture, however, is unclear. It is evidently a modern, valid and significant component of a comprehensive H&S training system, but is not necessarily applicable to all H&S issues.

### ***Other issues***

Various other suggestions are made in the local literature, but with no evident consistency. These include modelling, systems learning, cognitive apprenticeship and African collective learning systems (Venter, 2000:34-35), and demonstrating caring behaviours (Loubser, 2010: 45). A previous literature review I was commissioned to do revealed support for Freirian-type empowerment-based approaches and video as a training modality for mineworkers (Tuchten, 2005:17, 19). These topics did not recur in the current local literature, and empowerment approaches are dealt with in Chapter 2. The quality of training in the sector is an acknowledged problem, and the MQA is currently addressing the issue with the introduction of programmes for educators and trainers (Frankel, 2010:44; Mqa, 2010:62; Mqa, 2011:91).

## 5.8 Conclusions

The MHSA is extensive and formulated according to world standards, but is proving difficult to implement. The policy framework for training, provided by the legislation and the skills levy, has not offered public evidence of an extensive and high quality H&S safety training system for elementary workers. A number of legislative and policy requirements, additional to the MHSA, influence training priorities and plans in the mining sector. The public documentation of the sector suggests that the dedicated focus on mine H&S training may be displaced by a number of contingencies: agencies may be required to comply with many diverse policies; the menu of policies may enable a bias towards those who are amenable to demonstrating compliance; or there may be a bias in the structure of reports.

The H&S training logic of the MHSA, which originated in the Leon Commission of 1994, has three foci: task- or operator- specific training, ABET, and hazard-specific training. These do not appear to be fully addressed in the information available on H&S training. Occupation- or task-specific training is the H&S intervention that currently shows most evidence of progress. The low showing of ABET indicates that it is necessary to facilitate comparable awareness and mastery of H&S subjects outside of ABET structures. The hazard specific aspect of H&S training on generic and critical issues such as lung health appears to be quite neglected. Limited evidence is available of dedicated H&S training for mineworkers, focussed specifically on problems that represent the greatest risk to health. The neglect of advocacy around lung disease and other critical occupational health problems is a breach in local interventions and supports a case for immediate additional and alternative interventions. Both the conceptualisation of H&S as a generic subject or issue for mineworkers; and its facilitation outside of ABET and operator training are core problems.

The generally low levels of formal education in the mining industry are assumed to negatively affect H&S. However, the negative effect of under-education is not analysed in depth. ABET is perceived to contribute to H&S and probably does so via three sources of efficacy: literacy, enhanced H&S awareness, and self-concept.

The MSA has been responsible for the design and delivery of extensive qualifications and skills programmes, and has assisted in the development of national unit standards for these programmes. Many of the unit standards and skills programmes contain elements that relate to operating in a safe and healthy way. However the training of elementary workers, machinery operators and drivers is often the responsibility of employers, because such workers generally do not have the adequate formal schooling which would make them eligible for accredited skills courses and qualifications at NQF Level 1. These categories of workers may be excluded from operator qualifications and skills programmes because of their lack of education. The issue of language policy is marred by a lack of serious engagement with language use and practices in mining. Risk assessment processes and computer-aided virtual-reality equipment have unique and valuable uses in H&S training, but are not applicable to all issues. Generally, the integration and adaptation of a number of approaches and methods appears to work best.

Research in South African mines supports a move away from a compliance-based approach to one that supports the development of competence/efficacy in identifying and managing risk. This builds on a finding that there is a positive measure of self-preservation among South African mineworkers, compared to other countries. The transformation of mine H&S culture is a current research concern. Such a culture is dynamic and defined in different ways. At the work team level, it relates to Bandura's notion of social persuasion as a source of efficacy. Rather than grand designs of culture change, it may be valid to address sources of social persuasion at an underground team level, facilitating awareness directly where efficacy is most vulnerable, at the interface between workers and team leaders. However, the negative critique may be an inadequate base for formulating training approaches. Recent research points to positive features of team culture, such as ingenuity and concern for sick co-workers. Generally, research that approaches complex issues, such as H&S culture or even ABET, as single concepts has limited interpretive value. Deeper and more open-ended contextual research is required to inform approaches to advocacy and training, and contribute to building a theoretical base for addressing a dire national problem.

## CHAPTER 6

# HEALTH PROMOTION, EDUCATION AND COMMUNICATION

### 6.1 Overview

#### *Introduction*

This chapter aims to discover unique insights from research in health promotion, education and communication in South African mines and in other comparable contexts. The broad topic is generally referred to as ‘health promotion’ and constitutes an entire discipline. Many theoretical models have been developed both to analyse and to address behaviour change in relation to health. These refer to issues such as health literacy, social influence, dialogue, motivation and reasoning in behaviour change, stages in behaviour change, and self- and collective efficacy (Goldstein, 2007:2-4). Evidence of their application to mine H&S is not easy to find. The Soul City health communication project in Johannesburg has considered many models in the course of extensive work using popular media, and states that ‘individuals can be found at different stages of a particular model under discussion’ and that human change is really erratic. It is characterized by ‘stops and starts, backward and forward movement and that certain phases may be skipped altogether’ (Goldstein et al., 2004:116-117). The quest may not be for the perfect model, but rather for valid insights and information about what works in the context.

The selection of sources was therefore based on the judgment of those who offered definitely typical or telling insights that related to the focus of this study. Primary research into the application of models and approaches often relates to particular diseases, especially those that involve chronic medication and self-management; examples of these include the control of diabetes, recovery from heart attack, and conditions that involve giving up smoking. With reference to the context of developing countries, the bulk of the information accessed relates to HIV/AIDS, with malaria a distant second.

Focusing on South African mineworkers, I found that studies have emerged in recent decades on mineworker awareness of HIV/AIDS and TB (see later), fatigue (Schutte, 2010), and hearing device usage (Hansia & Dickinson, 2010). Apart from the studies of HIV, these do not amount to a critical mass of information. Lung health is dealt with in a separate section below.

### ***Occupational health delineated***

As stated before, occupational health has been neglected in South African mining, as compared to the attention given to safety and accidents. The coverage on training in the main textbook on Occupational Health Practice in the South African Mining Industry adds up to one page out of 440 (Guild et al., 2001:6,12,30). Apart from the reasons stated in Chapter 2, the delineation of the discipline may influence policy and approach. ‘Occupational health comprises two principal elements (i) occupational hygiene and (ii) occupational medicine, and these are enshrined in the Mine Health and Safety Act’ (Badenhorst, 2004:48).

*Occupational hygiene* is the term used to describe the technical preventive measures taken at a workplace to protect the health of the workforce, i.e. the recognition, evaluation and control of micro-environmental stressors such as dust, heat, hazardous chemical substances, etc. *Occupational medicine* deals with the health status of the employees potentially exposed to the micro-environmental stressors. Aspects such as pre-employment, pre-placement, periodic, special and exit medicals fall under the occupational medicine umbrella (Badenhorst, 2004:48).

Although training is advocated in the MHSA, no section within conventional mining structures appears to be suited to undertaking occupational health training. The limitations of current occupational health approaches are observed more in workplace contexts generally and are subject to interrogation and challenge:

In sum, the orthodox notion of occupational health has become outdated and is being redefined substantively with the advent of ‘employee wellness/health management’ programmes. However, evolution of these programmes does not mean simply adding on components. The inclusion of new components presumes that demands have changed, and so a programme as a whole may require recalibration. This is a point that private sector programmes in South Africa have yet to reach (George & Quinlan, 2009: 27-28).

### ***Mining and worker health***

The mining industry has a long history of providing health care facilities for sick and injured mineworkers. However, this care is generally only available to employed workers and is therefore temporary, while many occupational diseases are chronic, as explained below:

Most occupational health services are provided by private enterprises for their own, currently employed workers. Frequently, only the larger well-resourced enterprises offer these services. Once they leave formal sector employment, the majority of these workers are reliant on public health care. In the case of migrant workers, it is the public health system of their country of origin that assumes the responsibility for their health care (Rees, Murray & Grainger, 2011:14).

Mining health services have generally focussed on curative rather than preventative care. ‘The concept of preventive therapy was not only new to patients, but also to health staff,’ Charalambous et al., 2004:54). This has changed over the past 10 years, probably due to the effects of HIV/AIDS advocacy:

The lack of effective treatment for the rising numbers of employees with HIV infection left many primary health centre staff feeling helpless, and therefore many welcomed the introduction of preventive therapy. Some staff, however, did not accept it so readily, and many expressed concern that the new service would increase their workload (ibid:54-55).

### ***Self-efficacy and health interventions***

A few of the sources located refer to self-efficacy directly, as a central aspect of the health behaviour of mineworkers. However, engagement with the construct was generally not nuanced. Goldstein (2007:4) identifies self-efficacy as a key construct in a behaviour change *process*, but other studies use the self-efficacy concept as a descriptive or analytic tool, rather than a constructive one. Low self-efficacy of mineworkers is referred to as powerlessness and a lack of control, which contributes to risk taking (Campbell, 2003:30 and 156; Campbell & Williams, 1999:22; Meekers, 1997:3). ‘Self-efficacy (or the degree to which a person feels that s/he has control over important aspects of his or her life) is an important determinant of health related behavior’ (Campbell, 1997:277). The work and life context of mining is said to entrench low self-efficacy:

For example, among men employed on the mines, levels of self-efficacy associated with health promoting behaviour appeared to be low: high levels of disease and injury were regarded as the norm, and miners felt that there was little that they could do to protect their health in their unhealthy and dangerous working and living conditions (Williams et al; 2001:352).

Workplace relationships appear to reinforce these attitudes:

Mineworkers feel powerless in a range of contexts in their lives. Many feel that they have limited power to address what they regard as injustices at work (e.g. having to work longer hours than contracted, having to work in dangerous conditions). *Indunas* (worker team leader) frequently do not take up their complaints, and when they do, they often have little success (Campbell & Williams, 1999:22).

The researchers reason that a perceived lack of control in one’s life in general may extend to a sense of lack of control of one’s health, and an increased likelihood of unsafe sexual behaviour (*ibid*:23). However, this use of the self-efficacy concept departs from Bandura’s original conceptualization in that it is more general in its use.

Referring back to the previous chapter, self-efficacy is the judgment by an individual of his/her ability to perform a particular task/activity within a specific context (Pajares, 1997:20; Kear, 2000:3). It is thus amenable to change. More general feelings of powerlessness have many sources and are difficult to address, as is the self-concept source of self-efficacy, a wider and more expansive notion of one's personal essence, including thoughts, feelings and values (Kear, 2000:2). Generalized lack of control is also equated with low self-efficacy. Locus of control is one source of self-efficacy, and a relatively higher internal locus of control, compared with an external locus of control, tends to coincide with greater self-efficacy (Bandura, 2005:26). Engagement with workers, both on aspects of H&S where they have a choice and those where they do not, could activate awareness of control issues in relation to H&S. For example, mineworkers usually have a choice whether to use condoms, wear masks or use respirators (internal locus of control), but do not have choice regarding the depth or location of the particular part of a mine they are assigned to excavate. The body of research (see Chapter 4) would suggest that it is possible to move beyond simply identifying self-efficacy as a barrier in health education programmes and begin to modify efficacy in relation to specific functions or abilities in the context.

## 6.2 Lung health

### ***Research***

Lung health warrants a dedicated section because, as reviewed in Chapter 2, lung diseases kill many times more mineworkers than accidents each year, and the mining industry is experiencing its worst TB epidemic ever. As seen in Chapter 2, the gold mining industry has the highest rates of TB of any group in the world (Rees et al., 2001:14). Yet, as suggested in the previous chapter, lung disease received scant or no attention in the H&S training reports reviewed. South African mineworkers continue to face an epidemic of occupational lung diseases: 'Despite a plethora of research on the mining industry, and the gold mining industry in particular, research impact (including disease surveillance) on policy implementation and occupational health systems performance lags' (Murray, Davies & Rees, 2011:S65). Substantial research is available on failures of the compensation system for TB in the mining sector, but a review of occupational health research in the mining sector concludes that 'very few

studies seem to have fostered sustained remedial action' (Murray et al. (2011:S71). They suggest that there is a lesson for the continent:

Mining is growing in southern Africa and in many low- and middle-income countries. Other countries could avoid the high levels of occupational diseases experienced in South Africa through an enhanced understanding of the implications of the failure to use research evidence (*ibid*:2011:S71/S75).

Many TB studies were sourced but are not included in this chapter because they focus on issues such as screening, epidemiology, autopsy results, drug resistance and different drug therapies. Such research is extremely important in monitoring lung disease and developing better cures or disease management, but I could not find evidence of links between such studies and training and awareness programmes. These require research of a more ethnographic nature, involving the perspectives of mineworkers and practices within the local mining context. A study of advocacy to promote uptake in a drug trial for TB preventive therapy in selected gold mines in South Africa (Grant et al., 2010:S37) is integrated into other relevant sections of this chapter. The smoking behaviour of mineworkers is a research concern because of the addictive and adverse effects of smoking, combined with dust, on lung health and noise-induced hearing loss (Cheyip, Nelson, Ross & Murray, 2007:200; Rees, Murray & Grainger, 2011:15). One study estimated the effect of the national anti-smoking lobby on a large sample of mineworkers over five years and reported 'a significant decrease in smoking prevalence over a relatively short period' (Cheyip et al., 2007:197). After considering relevant variables, such as price increases in cigarettes and changes in smoking habits, both of different groups and of the entire population, the study concluded that: 'The decrease in smoking prevalence among the employees may be partly attributable to the South African antismoking legislation and an increased awareness of the health impacts of cigarette smoking' (*ibid*:200). An implicit finding was that mineworkers are subject to influence by the messages of health advocacy. The H&S milestone targets set for 2013, referred to previously, include those concerned with silicosis.

The MHSC sponsored research and materials development to raise awareness of mineworkers of silicosis (Goldstein, 2007; MHSC, 2009b; Rees, Murray & Ingham, 2009b).<sup>38</sup> According to Murray et al. (2011:S71), translation of research into practice has been patchy, and these materials have not been disseminated by the MHSC, mining houses or trade unions. This may indicate that, within the mining sector, preparation and training of workers is not viewed as a viable option for dealing with lung health, or it may confirm a lack of priority or of a sustained intention to deal with occupational lung diseases, as suggested in previous chapters.

### ***Mineworker perspectives***

Much of the literature sourced on addressing lung disease among South Africans is undertaken within a medical management paradigm or may focus on one disease, such as silicosis or TB, for very good reasons. Of course, literature with wider and alternative approaches is available: for example, studies that focus on smoking (Cheyip et al; 2007) or compensation (Calver, 2008), as well as more recent accounts of occupational lung diseases of mineworkers (Murray et al., 2011; Rees et al., 2011; Roberts, 2009). However, research which considers the perspectives of the mineworkers themselves reveals that there is much confusion about the different lung diseases and the related issues, both within the workplace and beyond the work context (Calver, 2008:26-27; Goldstein, 2007: 19-20).

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<sup>38</sup> During the course of the project, Silicosis elimination awareness for persons affected by mining operations in South Africa (SIM 030603: Track C), of the Mine Health and Safety Council (MHSC), digital video discs (DVDs) and print materials were produced for mine personnel targeted at specific groups. Those specifically for underground workers and H&S representatives included DVDs , facilitators' guides and print materials.

- Ke pale ya Ntate Thabang le Sello (Story of Thabang and Sello) for workers and health and safety representatives, South Sotho language edutainment set in a mine.
- Uthuli (Dust) for workers and health and safety representatives, a powerful Zulu language drama set in a mine.
- Preventing Silicosis: A guide for health and safety reps (and Facilitators' notes)

(Source: MHSC, 2009b:7)

This was referred to briefly in Chapter 5, but is dealt with more fully here:

Many employees have little or no understanding of the processes that lead to occupational lung disease, their consequences, how to protect themselves from the conditions, the mechanisms of compensation, the Acts that apply, and what their rights and responsibilities are. This coupled with a high level of misinformation and complicated by low education levels amongst miners is a recipe for confusion and frustration (Calver, 2008:26-27).

Lung health logically constitutes a single but generic subject area to be addressed directly and coherently with vulnerable workers, a priority in the training and preparation of mineworkers for the workplace. The study of silicosis awareness among mineworkers in quarries, gold mines and coal mines by Goldstein (2007) provided a basis for materials development in relation to silicosis awareness (MHSC, 2009b; Rees et al., 2009b) and also contributed to an approach to training or advocacy of lung health more widely. For example, the research identified generalized and significant barriers to lung health efficacy (Goldstein, 2007:15-27). Examples of such barriers that could be addressed by training follow below:

- A feeling of powerlessness in the face of dust.

Workers felt that they measured the dust levels, but that there was no follow-through because collated reports on dust levels were not shared with workers (Goldstein, 2007:6-10).

- Lack of accurate information about different diseases (TB, silicosis, HIV/AIDS).  
There is much confusion about the diseases and their overlap. Lung diseases are sometimes grouped together as *phtysis*, and workers believe that one can change into another (*ibid*:19-20, 28).
- Lack of knowledge about the actual utility of PPE in relation to particle size.<sup>39</sup>

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<sup>39</sup> Proper use of the correct type of mask (or PPE) can ensure that workers do not inhale the smallest, most noxious and invisible dust particles, which become trapped in the lungs. Workers are often instructed to wear PPE without adequate explanation regarding particle size. They may then substitute PPE with more comfortable bandanas or balaclavas which provide no barrier to smaller, less visible dust particles.

Some workers felt the only reason they received masks was to protect management. Other respondents said that they used bandanas to protect themselves (*ibid*:12).

Many health promotion or training approaches could be used to address such barriers to H&S efficacy. Using the self-efficacy concept and approach would involve efforts to address the barriers cited above, and enhancing lung health efficacy would draw on three sources of self-efficacy: mastery, locus of control, and social persuasion. Such a programme would naturally require intense research and development; what follows is simply an illustrative example. Mastery aspects could involve awareness of the hazard, dust, which weakens the lungs, and of the risk of lung diseases such as silicosis, TB, and bronchitis, as well as the role of HIV. It would include accurate information about the prevention and treatment of different lung diseases, an understanding of and skill in dust measurement, analysis and reporting, as well as an understanding of the relationship between specially designed masks and particle size, and the value and implementation of techniques such as wearing protective masks, watering down, extending ventilation columns, and changing out of dusty clothes immediately after a shift.

Enhanced efficacy and involvement in dust monitoring could begin to address overwhelming feelings of powerlessness and exclusion in the face of dust, which in turn would relate to an increased internal locus of control. Carefully selected role models who have worked for a long time and remained healthy could provide positive modelling and social persuasion. More generalized requirements are that the training programme have a valid and positive focus, such as lung health, rather than a discrete medical diagnosis, that it is suitable for a target group composed of elementary workers, is of acceptable educational and communicative quality, and is supported by follow-up interventions. Such processes can be facilitated for adults outside of ABET, in any language, even Fanakalo. Different operators could be trained together, depending on the language and training modalities suitable for each learning group.

## 6.3 HIV/AIDS

### *Predominance of studies*

HIV/AIDS has been studied more than any other disease affecting mineworkers, and the aim of this section is to exploit this resource. Much of the more in-depth research found focuses not only on mineworkers but also engages with the interface between mineworkers and the wider community, such as local sex workers or the workers' more traditional places of origin. It seemed reasonable to review such studies, which focus on extended notions of mineworker communities and identified sending areas. A wider focus and the convergence between different disciplines, a feature of this study, have been necessary in HIV research:

One of the positive spin-offs of the HIV pandemic has been the drawing together, for the first time, of social scientists, research psychologists, biologists, epidemiologists, clinicians, community and industry representatives, public-health practitioners, and policy makers to assemble and address that dynamic mosaic called human sexual behaviour (Donovan & Ross, 2000: 1897).

The literature is diverse, and while the pandemic has been extensively researched, the research now appears to be on a downward trend. There seem to be fewer studies in the past few years than in the previous ten years. An explanation is offered:

Donor funding for HIV/AIDS interventions has peaked, as other interests have caught donors' attention. For example, Britain's Department for International Development has pulled funds for region-wide interventions – the new interest is climate change. Most European governments are reviewing their aid commitments, and some are expected to make substantive adjustments – downwards (Quinlan & Whiteside, 2009:12).

### ***Mining and HIV***

There are a number of explanations for the predominance of HIV studies in mining. Firstly, mineworkers operate and often live in managed environments, such as hostels and workplaces, which use the parade system referred to earlier, rendering them easier for study and statistical analysis than more diverse contexts (Fearnley, 2005:148; Horn, 2007:122-123). Secondly, the mining industry showed a concern for HIV long before many other institutions in South Africa (Campbell & Williams, 1999:6), though the reluctance of the South African state to engage with HIV has a bearing on this observation. The industry's early concern with HIV may have originated in the cost implications of health care for employed mineworkers. Although HIV is not, by definition, an occupational disease, HIV-positive workers develop serious AIDS-related illnesses that are expensive to treat while they are in employment, such as tuberculosis (TB) or forms of meningitis (Campbell & Williams, 1999:9). Other cost implications cited for mines are productivity, morale, worker turnover and absenteeism, due not only to sickness but also to the desire to attend funerals, which severely disrupt shift organization (Campbell & Williams, 1999:6-9; Fearnley, 2005:146). 'Securing the future impact of the HIV/AIDS epidemic through effective management allows shareholders to feel more confident that profits will be sustained and that the risks are fully minimised' (Fearnley, 2005:152).

In the context of post-apartheid South Africa, social pressure and the national visibility of HIV influence the actions of companies who gain positive exposure by being seen to address the issue (Dickinson & Stevens, 2005:289; Fearnley, 2005:148). A further external influence is the 'profit motive within the pharmaceutical industry' (Horn, 2007:121). From an H&S perspective, studies are emerging that demonstrate an increase in work-related injury rates associated with HIV infection (Murray et al., 2005:2023) and lowered tolerances of other occupational health hazards, such as heat exposure (van Wyk, 2008:59). The unnatural lifestyle of migrant workers living in single-sex hostels is frequently associated with HIV transmission (HEARD, 2002:2; Campbell, 1997:273; Hargrove, 2008:53; Rees et al., 2009:402). Consequently, the Mining Charter includes transformation priorities with regard to worker housing.

However, some mining companies have denied any link between HIV transmission and the housing of migrant workers in single sex hostels rather than family accommodation (Campbell, 2003:24; Campbell & Williams, 1999:5; Fearnley, 2005:150).

### ***HIV and training***

The amount of HIV research dedicated to training and behaviour change is a consequence of the lack of a single biomedical solution. For the foreseeable future, limiting HIV transmission depends on behaviour and, in particular, on modifying sexual behaviour where possible and appropriate (Donovan & Ross, 2000:1897). Mining industry approaches to HIV tended to rest on behavioural or biomedical responses (Campbell, 2004:23), but there has been a discernable shift from orthodox occupational health programmes to designing and implementing ‘employee wellness’ or ‘health management’ (George & Quinlan, 2009:19). To a limited extent, unions have been involved in prevention activities, but these have been initiated and funded by management or outside agencies such as NGOs (Campbell & Williams, 1999:10). HIV programmes commonly begin with ‘education and awareness’ campaigns and thereafter incorporate VCT (voluntary counselling and testing) services, possibly adding in ART (anti-retroviral therapy) and the provision of food supplements and ART for spouses (George & Quinlan, 2009:20). Clinical care is also provided for related diseases, such as tuberculosis (TB). However, workplace programmes are not achieving the desired result, that of disease prevention: ‘South African workplace health programmes have yet to achieve their core purpose: to prevent the spread of HIV and to ensure that HIV infected employees obtain treatment before they are too ill to work’ (George & Quinlan, 2009: 26). It is likely that many effective and innovative HIV programmes exist, but this study seeks convergence between different disciplines and approaches.

### **6.4 Possible approaches**

Themes in the literature that recurred or related particularly well to the focus of this study are organized thematically below. In most cases, these also relate logically to an issue in the previous chapter, though different terms are used.

### *Social capital*

*Social Capital* is a theory or concept (both terms are used in the literature) that features quite dominantly in the literature (Campbell, Williams & Gilgen, 2002; Campbell & Williams, 1999; Campbell & Mzaidume, 2001; Campbell, 2003; (Chiu et al., 2008). Social capital refers to a social and community context that ‘enables or supports the renegotiation of social identities and the development of empowerment and critical consciousness, which are important pre-conditions for health-enhancing behaviour change’ (Campbell, 2003:51). In certain ways, social capital has logical connections to H&S ‘culture’ in mining, though the social capital appears to have been subject to different forms of analysis. Application of the approach may involve engaging with *existing* social capital in the form of membership of voluntary community organizations (e.g. churches, residents' associations, youth groups) in order to explore the relationship between health and community networks (Campbell, Williams & Gilgen, 2002:2). The social capital generated by membership of such community groups is said to be associated with the positive community norms of trust and reciprocity between community members and a positive local identity (Campbell et al., 2002:4). It is argued that ‘an important determinant of the success of participatory health-promotional interventions is the extent to which they mobilize or create social capital’ (Campbell, 2003:51). With reference to employed mineworkers, the approach challenges the ‘management tendency to regard HIV/AIDS as a problem facing *individual* workers most appropriately dealt with at the biomedical/behavioural level,’ rather than at a *collective* level (Campbell & Williams, 1999:14).

In terms of social capital, HIV is conceptualized as a social and developmental issue to be addressed not only at the level of particular mines but also at the level of the formal and informal communities within which the mines are located, and within which miners conduct their everyday social and sexual lives (Campbell & Williams, 1999:3). This involves active participation not only of the mine management and trade union representatives, as is usually the case in industrial health projects, but also of a wide range of other ‘stakeholders’ – including the provincial and national health departments, local general practitioners and traditional healers, as well as representatives of a range of grassroots community organizations (Campbell & Williams, 1999:3).

A few primary studies of social capital in discrete communities in South Africa have been conducted, and illustrative examples present the approach most clearly. A study, conducted in Khutsong township in the gold mining area of Carletonville south of Johannesburg, yielded significant results showing connections between social capital and HIV and risk-related behaviour (Campbell, Williams & Gilgen, 2002:41). These results varied by age and gender and occurred in both positive and negative directions (Campbell et al., 2002:10-14). The findings are interesting, and indeed may be unique to the context. Statistically significant evidence of *positive social capital among men* was demonstrated by the following:

- Belonging to a sports club reduces the likelihood that young men will be HIV-positive.
- Belonging to a church reduces the likelihood that men will have casual partners (HIV risk)
- Belonging to a church reduces the likelihood that older men will drink alcohol (HIV risk) (ibid: 16-17).

Statistically significant evidence of *positive social capital among women* was demonstrated by the following:

- Women below the age of 25 years who belonged to youth groups were less likely to be infected with HIV.
- Women below the age of 25 years who belonged to youth groups were less likely to have casual partners than those who did not (HIV risk).
- Women who belonged to sports clubs were also less likely to be HIV-positive.
- Women who belonged to sports clubs were more likely to use condoms with casual partners (HIV risk) (ibid:17).

As the researchers concluded, ‘it was not surprising that membership of youth groups which specialise in activities relating to the personal development of young people’s social skills, confidence and personal ambitions are associated with better health and fewer sexual partners’ (ibid:17). Membership of a sports club may also ‘indicate a commitment to preserving one’s health and well-being’ (ibid). The studies generally concur that there is a connection between positive social capital and health, but that it is complex and variable (Campbell et al., 2002; 20; Kiggundu, 2005: 238-239).

Possible mechanisms that mediate the connection between associational membership (positive social capital) and health are self-efficacy and social persuasion. These are evidenced in the following quotes:

*Social persuasion:*

Health seeking behavior may be encouraged within intimate and supportive social environments, where fellow associational members might urge one another to seek early diagnosis and treatment of health problems. ...Communities with high levels of social capital might provide a broader range of peer contexts within which people could debate and negotiate the possibility of safer sexual behaviours (Campbell et al.,2002: 20-21).

*Self-efficacy:*

Members of cohesive and trusting community groupings are more likely to experience generalised levels of perceived self-efficacy or 'empowerment' which in turn makes it more likely that they will engage in health-protective behaviours, such as condom use or reduction in the number of partners (ibid:20).

*Negative social capital* has also emerged, much as it has in studies about the negative safety culture in mining. Overt forms of negative social capital were reported in a shack settlement near a gold mining community. Researchers found that the most powerful network in place was 'a male-dominated, hierarchical, and exploitative gangster committee' (Campbell & Mzaidume 2001:15). This finding may have generic validity because:

Communities with the highest levels of HIV infection may often be those that, like our study community, are the most disrupted or deprived. Existing norms and networks that health workers have to build on will often be characterised by violence and exploitation, or by conflict and competition, rather than by co-operation and trust (Campbell & Mzaidume, 2001:16).

Social capital can operate on a number of levels. A study of factors contributing to the stress of peer educators found that their *neighbours* were the second most significant variable after the amount of money earned (Dickinson & Kgatea, 2008:8).

Social capital can also be contradictory, i.e. positive in relation to some dimensions of life and negative in other ways. *Stokvels* or savings clubs present an illustrative example of an institution that has both positive and negative social capital:

For both men and women, stokvel membership was associated with increased sexual health risks. For both sexes young people who belong to *stokvels* were more likely to drink alcohol, young men who belong to *stokvels* were more likely to be infected with HIV, and women of all ages who belong to *stokvels* were more likely to have had a casual partner in the last year (Campbell et al., 2002:17).

Yet *stokvels* are not inherently negative institutions but have utility in poor communities in pooling resources, managing and accessing capital, social support, recreation and conviviality (*ibid*:18). The value of identifying negative social capital in H&S contexts lies in identifying important targets for interventions, ‘both due to the risk to which members may be exposed and the opportunities offered for negotiating behaviour change in cohesive and trusting community groupings’ (*ibid*:20). Even advocates of social capital as an approach to HIV interventions admit that it is unequally distributed in particular contexts, that it can be ‘a source of social exclusion,’ and that opportunities for accessing, creating and sustaining social capital are ‘constrained by poverty and other forms of inequality (Campbell, 2003:53). Social capital also operates at different levels.

On a macro- or structural level, the variables involved, such as economic development, rural poverty, migrancy, housing and the economic dependence of women, are beyond the powers of H&S programmes (Campbell & Williams, 1999:25; Campbell & MacPhail, 2002:342). However, an appreciation of micro-level social capital (team culture) could be very useful, as revealed in research on promotion strategies to facilitate mineworkers’ participation in TB prevention: ‘Endorsement of the study by individuals whose views are trusted and respected by the community also seemed critical; our experience suggests that the individuals with this influence may not be those one initially expects’ (Grant et al., 2010: S43). Micro-level social capital may be variable and subject to changing norms, but will influence how intended health and safety messages and behaviours will be taken up or discarded.

How far practitioners or peer educators can influence these norms is debatable, but both practitioners' and workers' understanding of a notion of social capital, and even careful discussion of the question, could enhance the self-awareness and self-efficacy. Researchers advise caution and a need for greater research (Chiu et al., 2008:529; Campbell, Williams & Gilgen, 2002:51). Although the overall focus of social capital is its collective and group setting, notions of mastery and insight learning emerge as relevant, as shown in the following quote:

Our empirical findings suggest it is not enough to conceptualize 'empowerment' in terms of boosting young peoples' emotional or motivational confidence in their ability to protect their sexual health. Empowerment also involves the development of *intellectual understandings of the way in which social relations contribute* (my emphasis) to the transmission of HIV, and undermine efforts to reduce HIV transmission (Campbell & MacPhail, 2002:343).

### ***Peer learning***

Associated with engagement with both HIV interventions and social capital is the use of peer learning. Peer learning basically involves the use of voluntary educators from among the peers of a target group of participants. 'In the workplace context, peer education is conducted by selected members of the workforce who receive training in basic health-related information, as well as training on how to facilitate discussion and debate in group settings' (Campbell, 1997:286). The underlying logic lies in the 'similarity between message source and recipient' (Dickinson & Kgatela, 2008:3). There are advocates for and against the use of peer practitioners in health education and communication. Within the social capital approach the use of peer learning is advocated, as shown below:

Such educators are then sent back into the workforce to raise debates about the issue of HIV as often as possible in informal work and recreational settings in such a way that people are encouraged to debate new health-related information in the light of their old views, opinions and identities. ...In such contexts people play an active role in debating the possibilities of alternative recipes for living, rather than passively listening to information presented by a relatively impersonal source in the style of more traditional health education programmes (Campbell, 1997:286-287).

However, research conducted on workers' experiences of mine HIV services reported that workers generally expressed concerns about confidentiality and rated nurses higher than volunteer counsellors in terms of their communication skills and medical knowledge (Charalambous et al., 2002: 714-5). Although H&S representatives are elected, their intended role is comparable to that of peer educators in terms of their part-time, unpaid and advocacy aspects. Research has shown that peer educators experience increased stress, which contributes to attrition of their numbers (Dickinson & Kgatea, 2008:1-2). 'Given this, their voluntary contribution to peer education can place them in awkward positions that challenge their personal commitment to helping others' (Dickinson & Kgatea, 2008:14). Peer educators require support and skills development in the form of presentation skills and networking in order to maintain support from within the peer network, as described below:

This calls for skills of engagement and encouragement *within* the ranks of peer educators if activity is to be maintained and increased. And, finally, if people are to listen, there needs to be attention on teaching peer educators how to engage with others, not only when making a formal presentation, but also in everyday moments for it is here, and not classrooms, that hearts and minds are won (Dickinson & Kgatea, 2008:14-15).

### ***Support for peer educators or representatives***

Many other aspects of the experience of peer learning, HIV and other health communication programmes may be applicable to proposed training for H&S representatives.

The target is to support training for 10 000 H&S representatives over the next year (MQA, 2011:53) and 40 000 over the next five years (COM, 2010:129). As seen in Chapter 2, the power and authority of H&S representatives in the industry is not assured (Baleni, 2007:2); nor is their capacity. Research into current functioning of H&S representatives concluded that their preparation had been inadequate: ‘Only a small minority had a systemic view of the necessity to improve health and safety systems and structures and the need to lift the priority generally in companies and the industry’ (Rees et al., 2007:4). Furthermore, a substantial proportion of current mine H&S representatives have limited formal education or English literacy and language skills (Rees, Ingham, Bello & Murray, 2007:21). This affects not only training plans but also engagement with documentation and confident participation in meetings conducted in English. However, I found on the internet agreements between some mining companies and the trade unions that insisted upon English fluency for H&S representatives. As discussed in Chapter 5, the current framework for the proposed training is outcomes-based and made up of the following unit standards:

<b>Table 16: Skills Programme: Occupational H&amp;S activities for part time/ workplace representatives and shop stewards in the mining and minerals sector</b>			
<b>Unit Standard Title</b>	<b>Level</b>	<b>Credits</b>	<b>US no.</b>
Explain basic health and safety principles in and around the workplace	2	4	259639
Describe the functions of the workplace health and safety representatives	2	3	259622
Conduct continuous hazard identification and risk assessment within a workplace	2	2	244383

(Source: MQA, 2009:3)

The skills programme and associated unit standards are all pitched at national qualifications framework (NQF) Level 2, between Grades 9 and 12. This educational level could exclude nearly half of all current representatives. Research into the formal education of H&S representatives in gold mines, coal mines and quarries revealed that 25% to 40% of representatives do not have the level of education usually associated with functional literacy or Grade 7, while 40% of representatives have below Grade 8 education (Rees et al., 2007:21). The relevant unit standards can be accessed on the website of the SAQA, and agencies providing training to H&S representatives can use them to formulate curricula.

The programme guidelines advocate 15 days of training (MQA, 2009:4). A perusal of the relevant unit standards suggests a strong focus on compliance with legislation and documented procedures, as well as hazard identification and risk assessment, with associated data gathering and reporting (See Appendix A). There appears to be little focus on increased mastery of occupational health issues and little engagement with the actual impact, either of the standards or of the representative him- or herself, on the workplace. Essential communication and networking skills also appear to be neglected.

### ***Competing beliefs and interpretations***

A recurring theme in the literature is that planned health messages are not simply transferred to workers but are actively ‘located within a complex and detailed web of ideas concerning health, sexuality, traditional values and healing systems’ (Campbell, 2003:25). (See also: Campbell, 1997:275; Fearnley, 2005:148; Charalambous et al., 2004:54; Donovan & Ross, 2000:1899; Liddell, Barrett & Bydawell, 2006:223). Health enhancing messages are not passively accepted by their audiences, but ‘compete with alternate beliefs, experiences and logics that may be more compelling than the information that the health educator seeks to impart’ (Campbell, 2003:26). An example in the mining industry relates to reluctance on the part of mineworkers to give blood samples:

Southern African traditional beliefs do not attribute health and disease to biological processes and infectious agents, and our population of mineworkers have generally received only a low level of formal education. Traditional beliefs of the gold miners contributed to reluctance to give blood samples and difficulties with education about the HIV disease. As traditional healers use blood for medicinal purposes it is believed by some that the blood is sold or that it may be used for malevolent purposes. Many mineworkers feared that the loss of blood may lead to a diminished sexual prowess. Amongst those with asymptomatic HIV disease, the concept of carrying a potentially lethal disease for a number of years without any appreciable impact on their level of fitness or visible sign of illness was sometimes hard to internalize (Charalambous et al., 2004:54).

Competing beliefs and interpretations can shape significant barriers to health messages and operate at all stages of dealing with health and disease, from origins to prevention and cure.<sup>40</sup> The syndrome is pervasive in all societies. For example, the use of condoms is widely promoted in HIV prevention programmes, but researchers have found a wide spectrum of complementary strategies used by individuals to avoid infection, (e.g. partner selection, topical or systemic chemoprophylaxis) which sometimes undermine condom use in high-risk situations (Donovan & Ross, 2000:1899). Notions of cure and healing are subject to the same complexities. Mineworkers in southern Africa are often located within a plurality of healing systems - seeking care and treatment from conventional doctors, traditional healers, church healers (prophets) and so on (Campbell & Williams, 1999:23). Most HIV programmes are associated with the conventional biomedical approach (though this is changing) and play a limited role in workers' total belief systems regarding health and healing. Although competing beliefs and logics require more care and attention in H&S programmes, they cannot be oversimplified.

The complexity of such beliefs and logics is well illustrated in a qualitative study of indigenous beliefs about HIV conducted in the rural Okhahlamba area of KwaZulu-Natal (Liddell, Barrett & Bydawell, 2006). Most men from the area are migrant workers and HIV prevalence is high. Two aspects of indigenous thought were considered in relation to their attitudes to AIDS precautions: beliefs about *ancestral protection* from misfortune, and *traditional beliefs about illness* (Liddell et al., 2006:218-220). The findings showed strong evidence of traditional belief across the community on the two main research dimensions - ancestral protection and traditional beliefs about illness. ‘Overall, these findings suggest that rural Zulu communities possess elaborate and enduring systems of indigenous knowledge and belief’ (Liddell et al., 2006: 223). However, when these results were analysed in terms of attitudes to AIDS prevention measures the results were surprising.

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<sup>40</sup> An anecdotal example from community-based adult educators from the North West province is that there is a widespread belief that HIV is the result of a particular curse or ‘Makgome’. The curse is visited upon people who do not observe traditional mourning rituals, which demand that a bereaved spouse should remain celibate for at least one year. The logic of the belief is maintained because bereaved people die soon after their HIV-positive spouses (Mahlangu, 2009: Personal Communication). This belief has been reported in other studies (Meyer, 2008; Zaina, 2005).

Concerning the younger group (18-24 years), their intense beliefs in ancestral protection and traditional perspectives on illness did not significantly affect their attitudes to AIDS prevention, such as condom use. The findings for the group described as older, aged between 35 and 45, were different. A belief in *ancestral protection* decreased the acceptance or uptake by the older group of ideas about HIV prevention. Yet *strong traditional beliefs about illness* had the opposite effect for the same group. Strong endorsement of traditional belief about illness was significantly associated with acceptance of AIDS prevention measures such as condom use (Liddell et al., 2006:223). This was an unexpected finding, but some explanation emerged from within the research context:

One possibility is that condoms fit harmoniously with traditional views of infectious substances, and how these can be avoided. In the case of STDs, such substances are found in the bodily fluids of other people. A variety of protective charms and amulets can be worn as a means of warding off their harmful effects, and condoms may fit well with the concept of warding off contamination by polluted substances (Liddell et al., 2006: 223).

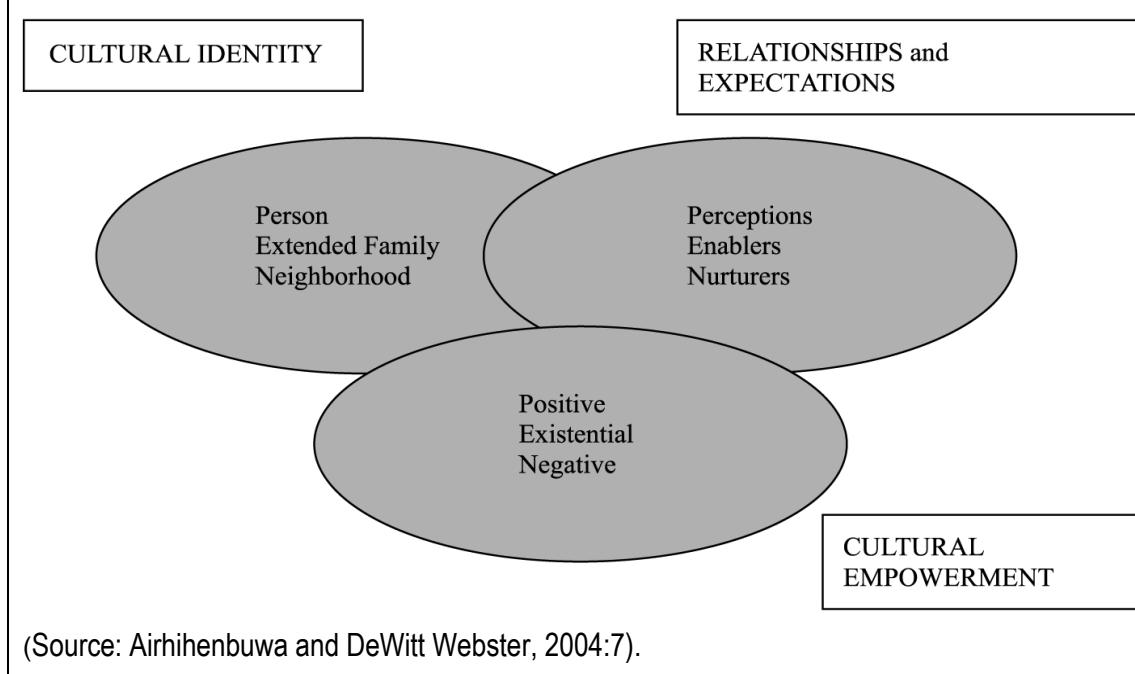
The researchers concluded that indigenous beliefs are not necessarily always at odds with those of Western medicine, a common assumption. ‘Indigenous beliefs can play a constructive role in the development of culturally sensitive models of risk and the development of more effective AIDS interventions’ (Liddell et al., 2006:224). Comparable beliefs have been long held in the mining sector. Many mineworkers believe that their lungs will be protected from disease if they drink milk and that growing a beard will protect them from noxious dust. The logic of the latter belief is obvious because when a worker emerges from working underground, his beard is visibly covered in dust. To counter the belief, accurate information on risk is required, i.e. that it is the invisible micro-particles of dust that are inhaled and not those trapped in beards that are the most noxious. Such beliefs are context-specific and not usually adequately addressed in mine health and safety training. Obviously, there are serious medical decisions to be made concerning the best treatment for people living with HIV or other diseases, but the issues raised concerning competing beliefs and logics are crucial for effective programmes.

Health education audiences will always engage in an internal debate between the new information presented by the educator and their previous information about the topic in question. ‘Well-planned educational programmes need to predict the way in which old information might seek to block the reception of the new messages they seek to impart,’ and educators need to ‘be informed by understandings of the way in which behaviours are shaped by socially negotiated identities within particular social contexts’ (Campbell, 1997:275-276). However, serious engagement with the competing logics and beliefs of a particular group of workers in a particular situation may require respect, trust, ongoing research and negotiation:

It might be more pragmatic to develop measures that are responsive to the circumstances that particular cultural groups find themselves in at particular phases of the disease’s (HIV) progression, even though such measures would lack cross-cultural generalizability, would be unstable over time, and would require in-depth specialist knowledge of a culture (Liddell et al., 2006: 224).

Acknowledgment of workers’ competing beliefs and logics about a particular syndrome will assist the educator in gauging the appropriateness and uptake of intended health messages. However, engagement with such beliefs and logics inevitably requires serious analytical criteria and skills. Airhihenbuwa and DeWitt Webster (2004) advocate a model, widely known as the PEN 3, for HIV programmes in Africa. The PEN3 model makes use of three domains, which incorporate specific constructs for its use: relationships and expectations, cultural empowerment, and cultural identity, as shown in the following table:

**Table 17: The PEN-3 model**



Core features of the model are that it advocates both positive and analytical approaches to cultural perceptions and beliefs. Focusing on the need to be positive, the writers state: ‘Culture and empowerment are two words that are almost never used as a coupled term because of the way in which culture is often represented as a barrier and empowerment as strength’ (Airhihenbuwa & DeWitt Webster, 2004:4). By not focusing on only negative practices or beliefs, the models provides ‘an opportunity for interventionists to address positive and existential behaviour so that negative practices, values and behaviours are located within the broader context’ (*ibid*:12). Thus the focus of change is to address certain issues in a context, rather than rehabilitate people out of their bad cultural beliefs and practices. The cultural empowerment domain of the model relates most directly to competing beliefs and logics as referred to above:

The goal of cultural empowerment is to ensure that an intervention is developed with the idea of *not* only the bad in mind, but also to promote the good and recognise the unique or indifferent aspects of culture. As a result, this model insists that, regardless of the point of intervention entry, the positive aspects of behaviour and culture must be identified as the first priority (*ibid*:7-8).

The beliefs, values and attitudes that comprise the cultural domain of PEN-3 are also comprised of three categories, those that are positive, existential and negative (*ibid*:8). The model is illustrated below with specific reference to perceptions of HIV/AIDS:

**Positive perception** — refers to knowledge, attitudes and/or beliefs that positively influence decisions about HIV/AIDS prevention, care and support.

A critical aspect of this category is contextual values that allow one to see HIV as the result of one's behaviour, rather than one's identity (*ibid*:10).

**Existential perception** — refers to knowledge, attitudes and/or beliefs that influence decisions about HIV/AIDS prevention, care and support in a manner that could be described as unique to that culture. Such perceptions are often not positive or negative but do reflect characteristics and qualities that help to explain certain values of the people. (*ibid*:10).

**Negative perception** — refers to knowledge, attitudes and/or beliefs that negatively influence decisions about HIV/AIDS prevention, care and support.

...Myths and misconceptions about HIV infection lead to discrimination and human rights abuses (*ibid*:11).

It seems reasonable to post that such beliefs emanate not only from traditional cultures but also from the rapidly changing contexts of developing societies. Another consideration may be the *source of the belief*. Does the competing belief or logic emanate from a long-held traditional system, or has it evolved in the workplace environment? Beliefs that have evolved in the workplace environment may be more susceptible to modification or challenge.

### ***Risk perception***

As seen in the previous chapter, much has been written about procedures for the assessment, management and minimizing of risk in mining. However, studies in health refer to *perceived risk* from a different analytical perspective. Personal risk of disease (or accident) can be perceived to be low for a number of reasons, some of which can be addressed in training programmes. The first of these relates to *personal vulnerability*, which is considered to be an important requirement for translating knowledge about illness into behaviour change (Kiggundu, 2005:242; Campbell & Williams, 1999:15; Camlin & Chimbwete, 2003:231).

This has also been observed in applications of self-efficacy to the management of diabetes, heart attack recovery, and giving up smoking: ‘the person’s belief in susceptibility to harm’ was found to be an essential attribute of efficacy in relation to the specific health issue (Kear, 2000:5). Other factors that affect feelings of vulnerability include the sense that this problem only happens to other people, referred to as *othering* (Kiggundu, 2005: 242), and exposure to or personal knowledge of a person suffering or deceased from HIV/AIDS, referred to as a PWA in the literature (Camlin & Chimbwete, 2003:231). The link between feelings of vulnerability and acknowledging risk has been studied in Africa. Survey data from Kenya, Uganda and Zambia, involving men aged 20 to 40, found that exposure to a PWA was associated with reported behaviour change, such as condom use and reducing the number of sexual partners (Camlin & Chimbwete, 2003: 231). However, when a similar study was conducted with young urban South African women, the findings were different. There was no demonstrated association between condom use and having known a PWA, and condom use was strongly associated with knowledge that condoms could prevent HIV transmission (*ibid*). The researchers concluded that awareness of risk and behaviour change is not always straightforward, particularly for women in Africa, where *gender* power relations intervene. Social norms in southern Africa favour women’s deference to men’s control over sexual activity, including condom use: ‘Women identified their partner’s behaviour as a risk factor, while men identified their own sexual behaviour as a risk factor’ (*ibid*: 240).

Other contributions to risk perception are emotion, inaccurate information and dysfunctional comparisons. It has been asserted that most of the factors contributing to risk negation are *affective*, involving feelings for the sexual partner and reciprocation of these feelings (Donovan & Ross, 2000: 1900). This has been referred to as ‘affective override of cognition,’ a way of saying that his or her judgment was affected by intense feelings. Inaccurate risk perception may not only be the result of *inaccurate information* but also of *dysfunctional comparisons*, described as behaviour in which ‘people always compare their own risk with someone who is at much greater risk than themselves,’ leading to an inaccurate ‘assessment of oneself as being at substantially lower risk than dispassionate evidence would suggest’ (Donovan & Ross, 2000:1900).

Such dysfunctional comparisons could happen in mining, where H&S records differ vastly on different mines and even on different locations within mines, and where contract workers often have lower status than full-time employees. As stated in Chapter 2, most mineworkers are male, and masculine, even macho, identities are a feature of South African mining contributing to risk taking.

### ***The ABC approach***

The ABC approach is included here because of its association with developing countries. The approach is said to have been developed in Africa and has been endorsed by projects funded by significant donors, such as USAID (USAID, 2008:1). It uses the acronym ABC to communicate three main health messages, or build upon three fundamental prerequisites that can prevent or reduce the likelihood of sexual transmission of the HIV virus:

A for Abstain (or, if working with youth, advise delaying sexual initiation)

B for Be faithful

C for Condomise (correct and consistent condom use)

The approach has been used and has demonstrated successful outcomes in settings as diverse as Uganda and the USA (Wellings et al., 2006:1721). The sources of its success, however, vary in different contexts, and ‘the mix of components in national programmes needs to be tailored to the local context’ (*ibid*). For example, in Uganda the effectiveness of the strategy was based on an emphasis on abstinence and being faithful (*ibid*:1723), compared to an increased use of contraception and of welfare reform in the United States (*ibid*:1724). The ABC approach has attracted a polarity of views, one of the main criticisms being its presentation as an approach for multiple contexts. This is evident in interviews with local mineworkers, who, when questioned on their views on abstinence as a way of avoiding HIV, suggested that such an option would actually lead to loss of health:

A range of possible ill-effects of poorly regulated bodily fluids resulting from prolonged celibacy were mentioned. Informants dwelt the most on mental ill-effects: depression, short-temperedness, violence and an inability to think clearly. Less frequently mentioned were such physical ill-effects as pimples and obesity... Behavioural ill-effects included recklessness and impulsive behaviour. Lengthy celibacy might also lead a man to consider homosexual relationships which he would not have considered in other circumstances (Campbell, 1997:278-279).

The approach has reported successes, but is also perceived as instrumental in undermining the quality of interventions, as do inappropriately applied models: ‘The preoccupation with ABC strategies has the negative effect of distracting attention from the need for broader, integrated programmes in which all components are mutually reinforcing’ (Wellings et al., 2006: 1721). The ABC acronym is beguiling and provides a slogan or accessible profile for programmes, but it does not really constitute a full teaching and learning approach.

## 6.5 Reviews

### *Sectoral, local and international reviews*

Research into HIV transmission has reached a point where both local and international reviews of studies are available. A small selection of these is included here, for two reasons. Firstly, the criteria referred to in review studies tend to relate to programme evaluation criteria, rather than an approach to teaching and learning. Secondly, in spite of the huge volume of HIV studies, the kind of criteria discussed will soon be reaching a saturation point. In Uganda a comprehensive global review of 59 countries where data were available investigated both patterns of sexual behaviour and the implications for attempts to protect sexual health (Wellings et al., 2006:1706). The general conclusion was that behavioural interventions are needed that ‘take account of the social context, attempt to modify social norms to support uptake and maintenance of behaviour change, and tackle the structural factors that contribute to risky sexual behavior’ (ibid:1707).

Systematic reviews have focused mainly on assessment of interventions to change individual behaviour and show increased effectiveness where information is supplemented by skill building and counselling, such as use of condoms and safe sex negotiation, where theory guides design, where several delivery methods are used, and where context and the need for sustainability are taken into account (ibid:1717)

A comparable literature review was conducted in South Africa by Harrison, Smit and Myer (2000), and a summary of their findings is presented in the table below:

**Table 18: Elements of successful behaviour intervention programmes**

Systematic reviews of behaviour interventions with a positive influence show that successful intervention programmes have addressed:

**Outcomes:** aim for effect on timing and frequency of sexual intercourse, numbers of partners, and use of condoms or other contraceptives

**Design:** positive association between intervention design and outcomes

**Objectives:** include a narrow focus with few behavioural goals

**Theoretical basis:** is based on social learning or other cognitive-behavioural theory

**Content:** includes basic accurate information on risk; repeats essential messages

**Normative process:** strengthens group norms

**Skills-based focus:** includes experiential activities, especially the modelling and practice of communication and negotiation skills; training in coping skills; interpersonal negotiation and communication skills found to strengthen behavioural outcomes

**Duration:** interventions that increased condom use and involved fewer partners tended to be longer in duration; sufficient time for 3-5 intensive sessions needed for skills acquisition and retention

**Community emphasis:** focuses on community and cultural aspects; designs culturally appropriate/relevant and language-appropriate intervention; embeds AIDS intervention in broader contexts; promotes integration into the community

**Participation:** creates forums for open discussion; solicits participant involvement

(Harrison, Smit & Myer, 2000: 285)

This is a comprehensive list of elements of HIV interventions that lead to undefined ‘positive influence’, but evidence suggests that knowledge - while a necessary precedent to behaviour change - is not sufficient to make this happen (Harrison et al.,2000: 286). However, the researchers established that, while many studies have shown an impact on knowledge and attitudes, fewer have demonstrated an influence on actual behaviour change (ibid:285).

The researchers then looked closely at South African programmes which had been operating during the previous 10 years in order to suggest what could be done to deliver more effective local HIV prevention programmes (*ibid*:286-288). Their findings took the form of a more refined list of criteria for local interventions:

**Table 19: Criteria for HIV prevention programmes**

Targeting interventions at high-risk groups  
 Development of appropriate and well-designed interventions and the evaluation of their effect  
 Promotion of appropriate and culturally relevant messages  
 Combining behavioural and other prevention efforts, and developing links to health services  
 Providing resources

(Source:Harrison, Smit & Myer, 2000: 288-289).

Both the above tables look like checklists of accepted quality criteria for AET programmes. This serves to underline an ongoing and generic concern about quality in all adult and H&S training for adult workers. A comparable checklist has been compiled regarding HIV programmes for mineworkers and is presented as an ‘Aids brief’ for mining managers:

**Table 20: An optimal workplace HIV/AIDS/STD/TB programme**

- reflects an understanding of the context of mine workers' lives
- takes account of how the sexuality and health-seeking behavioural norms of the mine workers are collectively negotiated and the choices that they are empowered to make
- recognises the resources that the mine workers have access to
- identifies priorities for action which are realistic, which exploit inherent resources and which will receive support from management, workers, clients and community leaders
- uses the power of peer education
- provides training using participatory and skills-based techniques
- increases self-efficacy amongst mine workers to improve the likelihood that they will engage in health-protective behaviours
- works towards developing social contexts which are supportive of behaviour change
- provides accessible resources, such as condoms

(Source:HEARD, 2002:3)

This table is wider in focus than the previous ones presented and refers to contexts and variables outside of the workplace or training programme. These include variables ranging from developing individual self-efficacy of workers to developing ‘social contexts which are supportive of behaviour change’ (HEARD, 2000:3). The self-efficacy approach and use of peer education methods are advocated. Focusing on the mining context, which consists mostly of men, research suggests that individual-focused interventions need to be targeted to be successful, and that men have been successfully targeted in occupational contexts with consequent reduction in sexual risk-taking (Wellings et al., 2006:1717-1718). This coincides with the principal finding of the study of promotion strategies to facilitate mineworkers’ participation in TB prevention:

In conclusion, our experience suggests that with a tailored communication strategy, a community can be informed about a previously unfamiliar intervention to address a health problem, and community members can be mobilized to take part in community-wide preventive action (Grant et al., 2010: S43).

Targeting of programmes for specific groups appears to be essential. Mastery in the form of accurate information, as well as the necessary skills required to perceive and manage risk accurately, competently and confidently, is crucial. The programme must be linked to practical or tangible operations (e.g. condom supply, health checks) in order to facilitate the translation of knowledge into practice. Programmes need to be underpinned by a sound theoretical or conceptual approach. Many writers advocate cognitive-behavioural models which include Bandura and self-efficacy. Programmes should acknowledge and endeavour to promote messages that are contextually and culturally relevant, taking into account the socio-cultural context of a specific community. Strategies are required to sustain and support health messages and new behaviours taking into account whether life and work contexts are supportive or otherwise, of behaviour change..This can be achieved through a number of training sessions or by developing links and partnerships with other local agencies. The one-off training or awareness day, however, does not bring about behaviour change.

There is still space for deeper inquiry in order to inform the mechanisms of H&S education: ‘We need to know not only whether interventions work, but why and how they do so in particular social contexts’ (Wellings et al., 2006: 1707).

### ***Integrating models and approaches***

Several relevant and recurring themes have emerged from HIV studies, adequately supported by research and conceptually and contextually close enough to health and safety problems in mining to take further in this study. It is evident that no single approach to health awareness provides a perfect solution. Ideally informed H&S educators would be able to select appropriately from a number of useful approaches within their knowledge base. Research-based interventions appear to hold the most promise:

When developing an education intervention, it is important to be clear about what the project is attempting to achieve. We also need to understand precisely where the target audience is “at” in terms of the selected behaviour change model. This necessitates a thorough grasp of the target group and their understanding of the topic in question. An understanding of their knowledge about the topic, their attitudes, their self efficacy in relation to desired change, barriers to change and facilitating factors relating to change is needed. In addition, an understanding of the social norms in relation to the desired behaviours and the circles of influence is required (Goldstein, 2007:5).

## **6.6 Conclusion**

Carefully designed health education programmes can facilitate behaviour change and are most likely to do so if programmes are designed for specific target groups; if they aim to provide accurate information and facilitate necessary skills within a narrow range; are linked to practical or tangible activities, e.g. use of condoms or safety gear; are underpinned by a sound theoretical approach; acknowledge and endeavour to promote messages that are contextually and culturally relevant; and provide activities or links for the sustained support of new messages and behaviour.

Social capital has logical links to H&S culture and Bandura's notions of social learning and social persuasion as sources of self-efficacy. Social capital within a target community may be variable and subject to changing negotiated norms, but will influence how intended health and safety messages and behaviour will be accepted, reinforced or discarded in a social or operational context. However, many of the factors contributing to social capital are beyond the control of H&S educators. Consequently, engaging with social capital, culture or contextual norms may be more feasible on a micro- or team level in the workplace. Negative social capital may be useful in identifying specific target groups and potential barriers to the uptake of health messages.

An understanding of the competing beliefs and logics about a particular syndrome, held by individual workers participating in a health intervention, is also relevant. The connection between intended health messages and such pre-existing or traditional beliefs can be positive, neutral or negative. Risk assessment and management are part of mining literature. Health communication studies, however, refer to risk perception. Generally, when people experience a feeling of vulnerability, their efficacy in terms of a particular health hazard seems to be activated. Perception of risk can be modified by exposure to different variables, resulting in a more accurate perception and higher health efficacy. Risk can be displaced or denied through the following mechanisms: affect or intense emotion, 'othering' or a feeling or belief that a problem only happens to other people, inaccurate information, dysfunctional comparisons, and notions of masculinity or machismo. Risk acknowledgment can be enhanced by a feeling of personal vulnerability, personal exposure to someone suffering a condition, accurate information regarding the issue or disease and its prevention, and self-efficacy, which involves the confidence and competence to accurately assess and avoid risk.

Experiences in peer learning suggest that the role of voluntary peer educators is stressful and requires systems of skills development and support to avoid burnout and attrition. The proposed H&S representative system for South African mining emphasizes a rapidly expanding role for representatives and is in many ways comparable to a peer educator system.

The current unit standards, advocated as the base of the proposed training, suggest a strong focus on compliance with legislation and documented procedures, as well as hazard identification and risk assessment, with associated data gathering and reporting. There appears to be little focus on increased mastery of occupational health issues, little engagement with the actual impact of the standards in the workplace or of the role the representative him- or herself, and limited development of essential communication and networking skills.

## CHAPTER 7

# FINDINGS AND CONCLUSIONS

### 7.1 Introduction

This final chapter aims to present the findings of the study, answer the original research questions and integrate the information into a few critical conclusions. Much of the literature reviewed presents information that is in some way relevant to enhancing the H&S efficacy of mineworkers. Some of the sources provide positive guidelines, while others present serious cautions. The previous chapters all concluded with relevant findings. This final chapter, however, aims to integrate the different chapters and disciplines into more significant findings. These are discussed thematically below in four sections: firstly, support for the self-efficacy concept; secondly, key formulations that apply to conceptual approaches to H&S training; thirdly, addressing the formal requirements of the study; and, finally, findings that relate to H&S training more widely.

### 7.2 Findings that inform conceptual approaches to training

#### *Key formulations*

This section presents the ideas and formulations, from the literature reviewed, which elicited consistent or compelling corroboration in terms of their application to and ‘fit’ with the focus of this study. These key formulations were either supported across the topics reviewed; correlated to comparable ideas across the disciplines forming a kind of consensus; or were established by evidence or insights that were compelling and well rationalized.

### ***Support for the self-efficacy concept***

The literature reviewed in Chapter 3 revealed that the self-efficacy concept has survived time, criticism, numerous research studies, and many diverse applications. It has been verified in different practical and cultural settings. Research conducted outside South Africa has found that self-efficacy belief is a stronger predictor of subsequent performance than past performance or other motivational constructs (Klassen, 2004:206), and is a critical determinant of self-regulation (Pajares, 2002:5). As shown in Chapter 1, self-efficacy has been used in the South African educational, training and development context with varying degrees of engagement with the original concept, such as: developing Defence Force officers (Stadler & Kotze, 2006); supporting previously disadvantaged university students (Wood & Olivier, 2004); developing teachers (Wood & Olivier, 2008; Rudman & Webb, 2009); and investigating the entrepreneurial tendencies of different ethnic groups (Urban, 2006). It has also been used by the Soul City Institute in Johannesburg (Goldstein et al., 2004:116). The term is used in previous studies of the H&S behaviour of mineworkers (Campbell, 2003; Campbell, 1997; Campbell & Williams, 1999; HEARD, 2002). An essential problem with self-efficacy is associated not with the concept itself but with the term, which is used widely and loosely, often with a shallow appreciation of the complexity of the concept and its task- and context-specificity. The utility of the concept lies in its operative qualities and deeper understandings of how efficacy can be addressed via its accepted sources and a clear focus on its task and context specificity.

As discussed in Chapter 4, the six sources of self-efficacy advocated by Bandura are widely used in the literature. These are self-concept; mastery; social learning; social persuasion; locus of control; and somatic and stress-reaction control (Bandura, 1994; Bandura, 1997:5517; Bandura, 1998:54-55; Bandura, 2004, 620-624; ). The different sources of efficacy may be modified in ways to different degrees, according to the type of intervention. The study provided many examples of how the different sources of efficacy align with issues in mine H&S, especially in Chapters 5 and 6. There are too many to mention here. Furthermore, the concept focuses on efficacy rather than compliance, which has been a suggested shift by mining researchers (Hill & Pitzer, 2005:33; Phakathi, 2006:13).

Overall, the study finds that the self-efficacy concept is valuable in informing approaches to mine H&S training, but nuanced engagement with the concept, the possible sources of its modification and the task- and context-specificity of efficacy under consideration are essential.

### ***Mastery and new learning***

A clear thread running through the study is that learning, competence and confidence, i.e. experiences of mastery, enhance H&S efficacy. However, while essential, it is not the only requisite for H&S programmes. In terms of the self-efficacy concept, an individual's experience of mastery or successful performance is the most significant source of enhanced efficacy (Bandura, 2005:22-23; Kear, 2000:3). Social or vicarious learning was one of the founding ideas of Bandura's work. A development of this idea, parasocial interaction (Bandura, 1977b), using accessible media is relevant to H&S training in the context of the poor formal education of mineworkers. It has been used for silicosis awareness (MHSC, 2009b:7) and health promotion in South Africa more widely (Goldstein et al., 2004). Addressing the H&S mastery of underground mineworkers will usually require new content learning, in the context of ongoing technological development coupled with low levels of formal education that result in limited knowledge of pertinent subjects, such as lung diseases, geology, chemicals and electricity. The critical issue of new content learning is not adequately dealt with in any of the approaches covered in this study and requires more inquiry into relevant experience in related areas such as adult learning, health literacy and scientific literacy.

As suggested in Chapter 4, outcomes-based approaches have not always been well used in South Africa, though there is utility in formulating broad performance outcomes of training programmes. The effect of unit standards on approaches to learning depends on their logic, coherence and quality. Empowerment approaches allow for minimal assurance of curriculum and content. Transformative adult learning approaches advocate some form of critical challenge in the learning process (Cranton, 2002:66). Cognitive or intellectual challenge, embedded in the communication of content, may be critical to effectiveness.

As discussed in Chapter 6, health promotion research would suggest that such mastery can include accurate information, practical competences, coping skills, self-beliefs and negotiation skills that enable people to exercise control over their lives. Even studies of the influence of social capital on health efficacy, which generally have a collective focus, suggest that ‘intellectual understandings’ of the way in which social relations affect health are essential (Campbell & MacPhail, 2002:343). Naturally, the quality of instruction affects the development of mastery, and such quality is influenced by a full range of variables, including recruitment, curricula, materials, delivery mechanisms, assessment options, reward and reinforcement mechanisms, and, in particular, the qualities of the educator.

The established discipline of adult education has much to offer in terms of research and analysis of these variables, as does the substantial body of literature on the nature of adult learning and engagement with adult learners. An observation made in Chapter 5 was that the quality of training in the sector is a problem, an issue the MSA is currently addressing with further educator training (Frankel, 2010:44; MSA, 2010:62; MSA, 2011:91). Many of the core principles of adult education, such as learner-centeredness, respect for the adult learner and integration of learning and experience, remain important to the quality and effectiveness of training programmes. H&S trainers could learn much from the discipline. As suggested by one of the most enduring adult education writers, Jarvis (1995:99-100), in Chapter 4, much more research is required into correlations between adult learning and experience. A finding of this study is that learning needs to happen in H&S training, in the form of new content, skills, insights or behaviours, and that the issues of how the required teaching and learning can occur in the mining context are not adequately addressed in the literature reviewed and require much more interdisciplinary study.

### ***Risk perception and management***

Analytic approaches to H&S involving hazard identification and risk assessment are, as seen in Chapter 5, fundamental to the MSA (Hermanus, 2007:536) and evident in the literature concerned with mine safety. Such approaches are endorsed as essential to H&S mastery in South African mining. However, health communication studies reviewed in Chapter 6 refer to risk perception and ways of facilitating a more accurate perception of risk to promote H&S efficacy via a number of mechanisms.

Research suggests that acknowledgement of risk can be activated by a feeling of personal vulnerability (Kiggundu, 2005:242; Campbell & Williams, 1999:15; Camlin & Chimbwete, 2003:231) or exposure to someone suffering from the condition under discussion (Camlin & Chimbwete, 2003:231). Risk can be displaced or denied through the following mechanisms: affect or intense emotion, othering, inaccurate information, dysfunctional comparisons, and notions of masculinity or machismo. An individual's belief in susceptibility to harm is also recorded as a relevant cognitive process in self-efficacy studies (Kear, 2000:5). More functional risk perception can be facilitated via accurate information regarding the issue or disease, its prevention, management or cure; or through self-efficacy, which involves the confidence and competence to accurately assess and avoid risk.

Liddell et al. (2006:224) advocate culturally sensitive models of risk for effective health promotion. As seen in Chapter 3, a central development in the self-efficacy concept involves a shift to *perceived* self-efficacy (Pajares, 2002:5; Bandura, 2005:25-26; Bandura, 1977a:204-205), confirming the role of perception and belief in efficacy, rather than a simple transfer of information and ideas. Risk assessment, management processes of safety training and the risk perception logic of health promotion do not appear to be integrated in the literature reviewed. An integration of these ideas may provide a more valid, comprehensive and grounded approach to risk in the training of mineworkers. A finding of this study is that the ideas found in health promotion literature regarding risk perception are not evident in the safety literature on risk management reviewed. Yet workers' perceptions of a hazard, its risk to them, and their perceptions of their efficacy and control in responding, are essential aspects of H&S training.

### ***Existing and associated logics***

A recurring concern in the literature of health promotion (Chapter 6) was that the H&S messages of training programmes cannot be simply transferred to workers. Such messages align, integrate or even compete with existing perceptions, beliefs, logics and experiences (Campbell, 1997:275; Campbell, 2003:25; Fearnley, 2005: 148; Charalambous et al., 2004:54; Donovan & Ross, 2000: 1899; Liddell, Barrett & Bydawell, 2006:223). In general I found very limited available research on worker perceptions, perspectives or beliefs regarding mine H&S.

These attendant beliefs or perceptions are complex, vary among different age groups and communities, and do not always compete with health messages, though they may complement them (Liddell, Barrett & Bydawell, 2006). Within South Africa, many such competing perceptions may stem from traditional beliefs and healing systems, but may also develop in the workplace context. For example, Charalambous et al. (2004:54) write about mineworkers' traditional reluctance to provide blood samples. Anecdotal accounts in mining record that some mineworkers believe that ear protection is bad because it causes ear fungi and they will not hear the start of rock falls. These are perceptions and beliefs of workplace origin. Airhihenbuwa and DeWitt Webster (2004) advocate a model, widely known as the PEN 3, for analysing such beliefs or perceptions, broadly as positive, existential or negative. The source and sensitivity of such beliefs may also be relevant, whether they emanate from a valued cultural system or the workplace, and as such are more amenable to change. A finding in this regard is that the investigation and acknowledgement of existing and associated beliefs and logics of workers about a particular syndrome is essential to H&S programme planning. Ethical engagement with such beliefs and logics will inform the content and logic of H&S programmes and indicate possible challenges to new information and behaviour.

### ***Team ethos or social persuasion***

As seen in Chapter 5, the overall H&S culture of South African mines is described in negative terms in the literature (MQA, 2011:31; COM, 2010:129; DME, 2010:126; Hill & Pitzer, 2005:3). Yet the aim of changing the H&S culture of mines or companies may not readily reach elementary workers because of the hierarchical nature of mining companies and the physical layout of mines, described in Chapter 2. The collectively focused social capital approach is well represented in health promotion literature (Campbell et al., 2002; Campbell & Williams, 1999; Campbell & Mzaidume, 2001; Campbell, 2003; Chiu et al., 2008) in Chapter 6. The approach is, however, usually located in a broader social context than the workplace, and many of the factors contributing to wider social capital are beyond the control of H&S educators. Yet other health promotion specialists agree that social norms and circles of influence regarding the desired behaviours do matter (Goldstein, 2007:5). Perhaps H&S culture can be redefined.

For the purposes of this study, I make use of an integrated view of the H&S culture, immediate contextual influences and group norms which most directly affect elementary mineworkers, to which I refer as *team ethos*.<sup>41</sup> Efforts to address H&S practices for sustained efficacy are for many reasons probably most effective if focused on and aligned to the level of team ethos. As seen in Chapter 5, mineworkers operate in small teams or panels underground, and H&S efficacy becomes most vulnerable at the interface between workers and team leaders (Frankel, 2010:39; Hill & Pitzer, 2005:27). This may be the only level where elementary workers have opportunities to negotiate control over their own H&S and where they are most influenced by their peers. The source of self-efficacy that most particularly applies to team ethos is social or verbal persuasion, which works in both positive and negative directions, as does the researched evidence of team ethos.

As seen in the evolution of the concept described in Chapter 3, self-efficacy is also task- and context specific (Pajares, 1997:20; Bandura, 1986; Kear, 2000:3), as is the functioning of a mine work team or panel. Furthermore, research has identified positive features of team ethos on which to build, such as ingenuity, pre-existing skills and knowledge (Phakathi, 2006:3), as well as workers' concern for sick or fearful colleagues (Murray et al., 2005:2023; Campbell (1997:278). The significance of interventions aimed at finding positive aspects of behaviour and culture with which to engage is emphasized by health promotion specialists Airhihenbuwa and DeWitt Webster (2004:7-12) in Chapters 5 and 6. Two findings thus emerge in relation to H&S culture or context: a) a priority focus for studies of H&S culture or context is the effect of work team ethos on the H&S efficacy of mineworkers; and b) an approach that integrates positive and neutral aspects of team ethos will be more effective than one that appears to rehabilitate.

### ***Maintaining new learning and practice***

A significant issue is the maintenance of new learning in the workplace, whether in the shape of knowledge, skills, practices, attitudes or forms of communication.

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<sup>41</sup> *Ethos* is a standard English word, and the meaning can be found in any print or on-line dictionary. The word *culture* has multiple meanings in South Africa, and its use in H&S is yet another of its arbitrary uses, though the term is used internationally. Mineworkers have other cultural systems, activities and affiliations.

Maintenance of learning naturally applies to mastery and how well it is facilitated, and also to the effect of a team ethos on such mastery in both positive and negative directions. A comparable issue is described as ‘technology transfer’ in mining. Chapters 4 and 6 made references to the recorded challenge of technology transfer and the degree to which training and innovation are not carried into the workplace (Willis & Hamilton-Attwell, 1998 and 2002; Macfarlane, 2001; van der Heever, 2002). Evidence from studies of HIV/AIDS and health promotion suggest that post-training strategies are required to sustain and support the outcomes of programmes and to address contextual barriers (Wellings et al., 2006:1707; Harrison et al., 2000:288-289; HEARD, 2002:3; Dickinson & Kgatela, 2008:14). Studies focused on lung health of mineworkers also emphasize the significance of tailored investigation of and communication with target contexts and communities (Goldstein, 2007:5; Grant et al., 2010:S43). Policy suggests that the mechanisms for maintaining healthy and safe practices in mining are inspectors and H&S representatives. Yet, as described in Chapter 2, there is a national shortage of H&S inspectors and the preparation and support of H&S representatives may be inadequate, as discussed in Chapter 6. This study found that definite post-training interventions are required to sustain and support the new learning outcomes of H&S programmes and to address contextual barriers; and that those strategies may be most effective if focused on the site of team ethos where new practices are most amenable to positive and negative persuasion.

### ***Dialogic aspect***

An idea that recurred across the AET approaches and is implicit in many health promotion approaches is that of dialogue, consultation or interaction, which is viewed as critical for the engagement of adult learners or target participants. It is a process for, rather than a source of, efficacy development and applies to all sources of efficacy. Dialogic space facilitates worker engagement with critical issues and enables the sources of self-efficacy. In South African AET, enactments of ‘dialogue’ have been over-simplified, misunderstood or poorly used, with the result of alienating rather than facilitating participation. The use of embarrassing ‘ice-breakers’ with adults in training programmes is a common example. Consequently, notions of dialogue and engagement require attention. Most of the AET approaches reviewed in Chapter 4 use the concept of dialogue, but the most useful for this study was the notion of *dialogic space* (Rule, 2004).

Dialogic space is a more substantive notion of dialogue and one that refers to pragmatic issues of time, trust, struggle and responsibility (*ibid*). As such, it offers more than other notions of dialogue avoids the covert, but redemptive, tendency of so much AET, also mentioned in Chapter 4, that dialogue takes place between two levels of being, one superior to the other. The following are examples of these: between the expert and the ignorant, as seen in H&S literature and the way mineworkers are described generally in the literature; between the educated and uneducated, as in the Leon Commission, described in Chapter 5; between the lost and the saved, as in missionary education; and between the enlightened and unenlightened, as seen in Freire and other emancipatory approaches. A finding of this study is that H&S programmes for workers requires dialogic aspects or spaces in order to facilitate worker engagement and to provide opportunities for workers and other stakeholders to interrogate and negotiate ways forward.

### ***Summing up***

The key formulations above provide a set of essential considerations in formulating approaches for specific H&S training programmes for relatively less formally educated mineworkers. These are:

- New learning required
- Risk perception and management
- Existing and associated logics
- Team ethos
- Maintaining new learning and practice
- Dialogic space or aspect

A suggestion of Bandura's, cited in Chapter 3, states that a 'goal in theory building is to identify a small number of explanatory principles that can account for a wide range of phenomena'; and that generality is facilitated by a focus 'on integrative principles that operate across differing spheres of functioning' (Bandura, 2005:25). The six formulations above constitute a few integrative, substantiated and reviewed considerations to inform the validity and quality of H&S training for the most vulnerable and neglected mineworkers. The intention is that these formulations constitute essential considerations for worker H&S training regardless of the modality or method used.

Inevitably, they will require further, specific, contextual investigation when programmes are designed for specific H&S issues. The key formulations have been extensively discussed and supported throughout the study and above; and are therefore tabulated into a basic framework of key questions and considerations for training authorities, practitioners, providers or other interested parties. The table below represents the core findings of this study.

<b>Table 21: Key considerations for approaches to H&amp;S training of mineworkers</b>	
<b>New learning required</b>	<p>New learning required in the form of new content, new skills or new insights?</p> <ul style="list-style-type: none"> <li>• What is the subject and form of intended new learning?</li> <li>• How will it be facilitated and what is the validity of the approaches, methods, materials, modalities to be used?</li> <li>• What evidence will indicate that learning has occurred?</li> </ul>
<b>Existing and associated logics</b>	<p>Existing beliefs logics and practices affect uptake and maintenance of intended learning and messages</p> <ul style="list-style-type: none"> <li>• What are the existing practices, beliefs regarding the H&amp;S issue under consideration and the potential barriers to new learning?</li> <li>• What ethical research and engagement with existing logics and practices has informed training and post-training strategies?</li> </ul>
<b>Risk perception and management</b>	<p>Integration of safety (risk assessment) and health promotion (risk perception) ideas</p> <ul style="list-style-type: none"> <li>• What are target workers' real perceptions of the risk and its management?</li> <li>• How will perceptions and management of risk be addressed?</li> </ul>
<b>Team ethos</b>	<p>Relates to studies of H&amp;S culture, social capital and group norms</p> <ul style="list-style-type: none"> <li>• What is the connection between desired practices and current team ethos?</li> <li>• What positive and neutral aspects of team ethos have been identified, as well as problems?</li> </ul>
<b>Maintaining new learning and practice</b>	<p>Post-training strategies required to sustain new learning outcomes (skills, behaviours, attitudes) and address contextual barriers</p> <ul style="list-style-type: none"> <li>• Has the specific site of operation, where new practices will be most vulnerable to negative persuasion, been identified?</li> <li>• What specific post-training activities are designed into programme plans to address post-training barriers?</li> </ul>
<b>Dialogic space or aspect</b>	<p>Dialogic aspect of the programme enables interaction between workers and other stakeholders</p> <ul style="list-style-type: none"> <li>• When and how are workers able to challenge, question, discuss, plan and practise new learning and H&amp;S practices?</li> <li>• How are the dialogic aspects of the training programme to be managed and by whom?</li> </ul>

## 7.3 Formal requirements of the study

### *Recalibrating self-efficacy*

This section aims to resolve the original objective of the study to develop a conceptual framework, informed by the self-efficacy concept, and answer the research questions. The intention of the framework is to inform approaches to workplace H&S training and awareness programmes that not only go beyond informing workers of safe practices but are also underpinned by the rationale of developing worker self-efficacy for H&S. This includes consideration of those aspects of self-efficacy that can be developed by education, training and awareness programmes provided to mineworkers. Consolidating the data involves repeating some of the information. All of the six accepted sources of self-efficacy (self concept, mastery, social learning, social persuasion, locus of control, and somatic and stress reactions) are frequently applied to mine H&S issues. The literature of the different disciplines reviewed provided relatively more endorsement for some of these sources, such as mastery and social persuasion, but more research may provide a wider range of examples and change this observation. In addition, the six key formulations above emerged as significant considerations in designing approaches to H&S training for elementary mineworkers and other workers with limited formal schooling. These formulations are integrated into a tentative reconstruction of the sources of self-efficacy with reference to local mine H&S. See Table 22 below. An explanation follows the table.

**Table 22: H&S efficacy of South African mineworkers: Sources of influence**

This table presents an approach to H&S awareness and training that is informed by the self-efficacy concept.  
Adapted from: Bandura, 1994; Bandura, 1997:5517; Bandura, 1998:54-55; Bandura, 2004, 620-624.

<b>Somatic and stress reactions</b>	<b>Self-concept</b>	<b>Mastery and new learning</b>
<ul style="list-style-type: none"> <li>• Not usually addressed in H&amp;S programmes.</li> <li>• May be addressed by accurate information re diseases, sources of protection and treatment.</li> <li>• Highly affected by issues of reward, e.g. bonuses, overtime payments, promotion prospects.</li> </ul>	<ul style="list-style-type: none"> <li>• Not usually addressed in H&amp;S training.</li> <li>• Can be influenced by other forms of adult education, e.g. ABET.</li> </ul>	<ul style="list-style-type: none"> <li>• Learning needs to happen in H&amp;S programmes in form of new content, new skills or new insights.</li> <li>• Expanded and recalibrated for H&amp;S training.</li> <li>• Post-training support to sustain mastery.</li> </ul>
<b>Locus of control</b> <ul style="list-style-type: none"> <li>• Most opportunity for negotiation of control of H&amp;S at team level.</li> <li>• Forms of dialogic space provide opportunity to discuss and rehearse control issues.</li> </ul>		<b>Risk perception and management</b> <ul style="list-style-type: none"> <li>• Renewed approach integrating safety and health promotion ideas.</li> <li>• Integration of perception, assessment and management of risk.</li> </ul>
<b>Team ethos and social persuasion</b> <ul style="list-style-type: none"> <li>• Related to studies of H&amp;S culture, social capital and group norms.</li> <li>• Specific focus on work teams useful.</li> <li>• Identify positive aspects as well as problems.</li> <li>• Dialogic space enables interrogation of team norms.</li> </ul>		<b>Existing and associated beliefs and logics</b> <ul style="list-style-type: none"> <li>• Affect uptake and maintenance of H&amp;S messages.</li> <li>• Ethical engagement informs training and post training strategies</li> </ul>
<b>Social and vicarious learning</b> <ul style="list-style-type: none"> <li>• Forms of para-social learning media useful in context of low formal education.</li> <li>• Related to studies of H&amp;S culture, social capital and group norms.</li> </ul>		<b>Maintaining new learning and practice</b> <ul style="list-style-type: none"> <li>• Post-training interventions required to sustain new learning (skills, behaviours, attitudes) and address contextual barriers.</li> <li>• Ideally targeted at the level of team ethos where new practices most vulnerable.</li> </ul>

### ***Explanation of the framework***

The resulting framework is specifically focused on the application of the self-efficacy approach. The six accepted sources of self-efficacy, according to Bandura (Bandura, 1994:n.p.; Bandura, 1997:5517; Bandura, 1998:54-55; Bandura, 2004, 620-624), are extended to nine with notes from the findings of this study. These are:

- Self-concept
- Mastery and new learning
- Risk perception and management
- Existing and associated logics
- Maintaining new learning and practice
- Social and vicarious learning
- Team ethos and social persuasion
- Locus of control
- Somatic and stress reactions

The nine resulting sources of efficacy development are not viewed as discrete but as overlapping and interrelated sources of influence. Consequently, there is no particular starting point, sequential staging or practical guidelines for practice. These would depend on the specific nature of the H&S issue being addressed and on other circumstances of the training programme. For example, a focus on positive versus negative safety practices tends more to team ethos and social persuasion, while confusion about different lung diseases tends towards mastery in terms of content or accurate information. The framework may show a bias toward occupational health issues due to the influence of health promotion approaches, but this is acceptable, as evidence of such training for mineworkers is so scarce. It would be repetitive to discuss each source of efficacy again. The main points are presented below. Mastery and social persuasion are extended. Mastery is emphasized because it probably relates most directly to the H&S topic or issue selected for the development of new knowledge and skills. This is a critical issue because, as stated before, H&S as a subject or generic issue for mineworkers is not addressed in the training literature reviewed in Chapter 5. However, sources of efficacy such as mastery could also be recalibrated.

For example, mastery is also influenced by associated beliefs and logics, accurate perceptions of risk, and opportunities for positive or negative social persuasion at the level of team ethos. Forms of dialogue or dialogic space enable all sources of efficacy and require relevant attention. This tentative framework is a set of ideas and does not in any way provide a curriculum outline; instead, it should be seen as an approach to comprehending issues in enhancing efficacy in the context of mine H&S of elementary workers. The role of different approaches and frameworks is discussed next.

### ***The role of frameworks and models***

The process of this study caused me to become extremely cautious about frameworks, models for and solutions to H&S training. Paradoxically, I learned a great deal from the mass of literature which was excluded from this study, because it advocated solutions to H&S or the training of mineworkers but provided little or no substantial evidence. In an ideal training world, the definition of a conceptual framework, cited in Chapter 1 as a set of ideas to ‘formulate and justify alternative conceptual possibilities’ (Keet, 2006:42), would be valid. However, reviews of applications of H&S concepts, models and frameworks suggest that they are often condensed, truncated, oversimplified or misinterpreted in practice and frequently reduced to a single PowerPoint presentation or slide. The original research aim to produce a conceptual framework was not informed by exposure to the number of skeletal guides and directives in the form of unit standards, targets, computer packages and simplified risk assessment models that are touted as H&S solutions. Abbreviated concepts and theories are sometimes used to provide expedient short cuts for the custodians of the H&S training of mineworkers. Yet, while practitioners need theory and concepts in order to become better practitioners, engagement with many different models and concepts is the ideal. As seen in Chapter 6, theoretical engagement is advocated in health promotion studies as a factor which enhances the effectiveness of programmes, and health promotion researchers make use of aspects of different models for facilitating enhanced health efficacy (Goldstein et al., 2004:116-117). As seen in both the review of AET approaches in Chapter 4 and in the experience of mine H&S, rigid adherence to or inappropriate application of single models do not provide solutions.

In Chapter 5, Badenhorst (2004:47) is quoted as stating that ‘there is not one model, method, approach or framework that is right for safety training and no consensus established.’ Theoretical engagement with models and ideas may provide practitioners with skills to formulate appropriate approaches or select from a menu of valid options, but any framework, model, or process selected or advocated for training is only part of a relevant approach to training and requires substantial interrogation and adaptation with reference to the specific site of its application. Risk assessment processes have been found to work best when they are adapted for specific local mines and H&S issues (Furter, 2007:5-16; Foster et al., 1998:337; Stacey, 2009:291-292). Tailored strategies were also advocated in Chapter 6 for TB (Grant et al., 2010: S43) and HIV health promotion. The study found that H&S training of mineworkers may thus be better served by a research-based approach, informed by concepts and theory, than by dependence on a single conceptual framework.

### ***The research questions***

This section also addresses the framing research questions of the study, listed below:

*Research question 1: How can the concept of self-efficacy be applied to workplace H&S programmes for unskilled and semi-skilled workers in South Africa?*

The endorsed concept of self-efficacy is recalibrated and adapted to local mine H&S. It is based on Bandura’s accepted sources of self-efficacy, which have evident links to examples in the mining sector. With reference to *how the concept can be applied*: Self efficacy can be addressed via its accepted or adapted sources and an understanding of its task- and context specificity. Nuanced engagement with the concept, the possible sources of its modification, the type of efficacy under consideration and the context of its application are essential. Naturally different sources of efficacy are addressed via different mechanisms or modalities in different settings, e.g. medical versus workplace training.

*Research question 2: What are the key formulations (concepts, ideas) from related disciplines that have ‘logical relevance’ to the research issue, i.e. worker efficacy in H&S in South Africa?*

*Research question 3: Which formulations (concepts, ideas) are key contributions to a basic, foundational framework for worker efficacy in H&S?*

Research questions 2 and 3 are dealt with together. The six key considerations in the table above are drawn from different disciplines and chapters in the thesis. They are the key formulations that apply to the use of the self-efficacy concept or to any other conceptual approach or model selected for mine H&S training. Research questions 2 and 3 are addressed by the recalibrated self-efficacy framework (Table 22) and the key considerations for H&S training (Table 21) above.

*Research question 4: Does the tentative framework have meaning in the real workplace context?*

The original proposal for this research included a limited pilot study, which was to test the meaning or validity of the tentative framework. This proved to be too ambitious because of the logistical constraints of access to mines for non-employees. The pilot phase of the proposed study was consequently cancelled. However, the validity of the findings may best be demonstrated by undertaking another research exercise, possibly interrogating the findings with privileged observers, custodians of H&S training or other genuine stakeholders in the process. However, the relevance and fit with the local mine H&S context of both the recalibrated self-efficacy framework (Table 22) and the key considerations for H&S training (Table 21) above have been consistently referred to both above and throughout this study.

## **7.4 Findings that have wider training relevance**

### ***Introduction***

This section presents another set of findings of the study, those that have a wider focus than approaches to training. Although policy is not within the scope of the original research, this section includes comment on policy decisions, because of the critical and pervasive effect these have on AET approaches and practice. The convergent effects of national policy on mining, education and training are discussed in relation to their impact on the training of employed workers.

Existing policies also affect H&S training in terms of priorities and resource allocation. Furthermore, as suggested in Chapter 6, even when substantial research-based approaches are used to produce materials, dissemination by the MHSC, mining houses or trade unions has been patchy (Murray et al., 2011:S71). The underpinning substrate for mine H&S training appears to be flawed. This study is also located within a university department of Education Management and Policy Studies.

### ***Policy effects of the NQF***

National education and training policy is unhelpful in providing a policy context for the training of elementary mineworkers or other adults who lack formal schooling. The most recent and relevant legislation is the NQF Act of 2008. As discussed in Chapter 4, adult educators in South Africa have always raised concerns about the structure of the NQF because so many South African adults are excluded from the framework and unit standard-aligned training options. There are countless numbers of such workers, those whose schooling ended before the equivalent of NQF Level 1 or Grade 9, in mining and other industries that employ large numbers of elementary, unskilled or semi-skilled workers. Literature reviewed in Chapter 4 revealed that insignificant progress has been made in reducing adult illiteracy since the end of the apartheid era (Aitchison, 2008:1; Baatjes, 2008:206, 224; Aitchison & Harley, 2006; 98-99; Rule, 2006: 117), but the NQF Level 1 descriptor demands sound reading and writing skills (See Appendix A). NQF level descriptors apply to all unit standards-based training programmes, whether they are full qualifications or not.

Even if recognition of prior learning (RPL) is offered, workers may lack the informal skills to qualify in terms of the level descriptors. Anecdotal evidence suggests that level descriptors are not really applied during industry-based RPL processes and that the theoretical aspects of training are often simply ignored by providers. The preparation and training of such workers (H&S and other) is thus left to the discretion of employers or the training providers appointed by sectoral training authorities. Such workers can attend ABET programmes that offer subjects almost identical to those offered by schools. However, the reward for long and arduous ABET study is negligible compared to the effort involved for the adult learner. Other forms of training for such workers, including H&S, lack a policy substrate or formal regulation outside of school-linked ABET structures.

A further finding of the study was that the exclusion of the many South African adults who lack formal education (below NQF Level 1 or Grade 9) from the existing education, training and qualifications framework has facilitated the neglect of essential skills provision, such as H&S training, for many workers classified as elementary, unskilled or semi-skilled.

### ***Logic and rationale of H&S training***

The policy logic stated in the MHSA originated in the Leon Commission of 1994, with three discrete foci: task- or operator-specific training; ABET; and hazard-specific training. As discussed in Chapter 5, evidence that this logic is being implemented is only partially manifest in current documentation. The most positive evidence available is associated with task- or operator-specific training. The diminishing and low impact of ABET across the sector generally indicates that it cannot be viewed as a primary conduit for H&S efficacy. Only limited public evidence is available of H&S training for mineworkers that focuses specifically on H&S risks, rather than being attached to operator training with a focus on safe operations. A lack of effective advocacy and training around critical occupational health problems, such as lung disease, is reported in current research (Murray et al., 2011:S71), as well of H&S as a subject or generic issue for mineworkers (Frankel, 2010:45; DME, 2008:39). The most recent annual report of the MQA refers to only one detailed record of dedicated H&S training for the period 2009-2010, a skills programme for H&S representatives (MQA, 2010:53).

This appears to be a lapse in the system, or even a transgression of the rights to H&S of the most vulnerable mineworkers. However, the gap is an effect of the convergence of different policies. The first is in the logic that H&S can be facilitated via ABET and operator training, i.e. that H&S can be dealt with by being attached to operator training, rather than presented as a subject on its own. The second is the national education and training policy of the NQF, discussed above. Research reviewed in Chapter 5 reveals that half of all mineworkers formally employed left school before attaining a level equivalent to NQF Level 1 or Grade 9 (MQA, 2011:1). The proportion is probably much higher for elementary mineworkers. As described above, these mineworkers may lack the educational scaffolding for unit standard-aligned training or RPL processes.

Yet all mineworkers require H&S training or at least preparation for the hazards and risks in the workplace. At present, such preparation and training, a stated priority of all of the stakeholders in the industry, is left largely at the discretion of employers. According to research reviewed in Chapter 5, it is often either of poor quality or does not even take place (Frankel, 2010: 44; DME, 2008:37 and 63; Dias et al., 2007:8), and centralized guidelines are not provided by the sector education and training authority (de Leeuw, 2011:n.p.). The logic that H&S training can primarily be addressed via ABET and operator training (MQA, 2011:31), breaks down when faced with the constraints of the NQF and associated levels and unit standards. The training of countless vulnerable workers becomes ad hoc and lacks guidance or accountability. Two findings of this study relate to the current rationale of mine H&S training for elementary mineworkers: a) the current logic of H&S embodied in MHSA, with its three foci of task- or operator-specific training, ABET, and hazard-specific training, is not completely implemented as there is scant evidence of generic occupational H&S issues such as lung health of workers being addressed via training. Either the training logic or its implementation processes require renewal. And b) there appears to be no public, regulatory framework or set of guidelines for the H&S training or preparation of mineworkers who have limited formal schooling, yet may constitute the majority of and most vulnerable employees in the local mining sector.

### ***Health and safety representatives***

The role of H&S representatives in supporting, monitoring and advocating for the H&S of other mineworkers, as enshrined in the MHSA (Chapter 3, Sections 25-30), was discussed Chapter 2. However, the role is voluntary, without reward, and may be demanding. As seen in Chapter 6, comparable experiences of peer educators in industry suggest that the role is stressful and requires systems of skills development and support to avoid attrition (Dickinson & Kgatea, 2008:1). Training is proposed for 10 000 mine H&S representatives during the current training year (2010-2011) and 40 000 over the next five years (COM, 2010:129). The proposed training is designed according to an outcomes- or standards-based model, as outlined in Chapter 4. It is pitched at NQF Level 2, which is inaccessible to approximately half of all current H&S representatives (Rees et al., 2007:21) and is formally aligned with three unit standards (MQA, 2009:3).

The SAQA level descriptor for NQF Level 2 clearly demands fundamental literacy and mathematical skills (See Appendix A) beyond those of current H&S representatives. H&S representatives are ideally elected by their peers for their personal rather than their formal educational qualities. Yet unit standards-based training would exclude many elected representatives, and, as described above, one-off RPL processes would not necessarily enable their inclusion. As discussed in Chapter 6, scrutiny of the relevant unit standards suggests a strong focus on knowledge of legislation and documented procedures, as well as hazard identification and risk assessment, with associated data gathering and reporting (See Appendix B). Information on other training options for H&S representatives could not be found.

Research into the perspectives of H&S representatives has revealed a generally inadequate understanding of their advocacy role in the workplace and the significance of dust as a hazard (Rees et al., 2007: 57). Yet the unit standards suggest little evidence of focus on increased mastery of occupational health issues or on the actual impact of the representative's role on the workplace or on the representative him- or herself. Communication and networking skills, reported to be essential in comparable peer education situations (Dickenson & Kgatea, 2008:14-15), also appear to be neglected. Based on available evidence, this study finds that the proposed training preparation of H&S representatives is inadequate for their proposed role and does not realistically accommodate their researched levels of formal education and language usage. Much more research is required into the workplace demands to be made on representatives, their existing abilities and logics, the experiences of peer educators or H&S representatives in comparable contexts, and appropriate training interventions.

### ***Policy priorities***

The H&S of mineworkers is always mentioned in policies and publications of the mining sector. However, a very specific focus on H&S training of the most vulnerable workers, those categorized as elementary workers, machinery operators and drivers, suggests that their health and safety promotion falls between different policy priorities. Section 10 of the MHSA has clear requirements regarding H&S training of all workers, but compliance is extremely difficult to monitor on many widespread mines. The ever-increasing use of contract workers further confounds efforts to enforce compliance, as workers often move to different locations.

The more recent Mining Charter is concerned with transformation of the sector but makes reference to H&S and housing for workers (DMR, 2010:1-4). As described in Chapter 5, the most evident aims of the Charter are to transform the profile of power relations and resource allocation in the sector via changes in ownership, procurement and management (See: DMR, 2010:1-4). Health and safety as such are not addressed directly.

Scrutiny of the actual sector training plans also does not provide public evidence of specific priorities. The NSDS III was finalized by the DHET in 2011, with an emphasis on the effectiveness and efficiency of the skills development system (DHET, 2011:5). Sector training authorities such as the MSA have responded accordingly in their current training plans, prioritizing activities such as objective decision making, research, information management, monitoring and evaluation (MSA, 2011:129). Such priorities are valuable, but again do not give precedence to H&S. A finding of this study is that policies and directives, emanating from both the mining and education and training sectors since the MHSA was drafted in 1996, may have displaced H&S as a priority intervention for agencies in the mining sector.

### ***Policy to practice continuum***

Tripartite stakeholder consultation is probably the basis for most policy development in South Africa and the mining industry. As cited in Chapter 2, the primary reliance on stakeholder consultation for policy development and planning of education and development programmes in South Africa is being questioned. Realism regarding the dynamics; the feasibility and utility of the policy produced; the actual dispersal of vision and responsibility; and the unequal power of different stakeholders are raised as cautions (Jansen, 2002:207; Campbell, 2003:181; Hamman et al., 2008:23). In fact, different mining stakeholders are often intense competitors in the marketplace, and H&S records influence foreign investment in individual companies. Tripartite stakeholder policy developments in the form of goals and targets, such as the 2013 H&S Milestones and 2008 Tripartite Action Plan for H&S, are described in Chapter 2. However, available data indicate that local mining is not achieving the level of improvement needed to reach the milestones (Hermanus, 2007:535; Frankel, 2010:17). This evidence resonates with the experiences of Marschall and Shah (2005), cited in Chapter 5, regarding such policy-making processes.

Problems and targets are identified and agreed upon by a range of stakeholders, but the outcomes of such policy-making processes often lack underpinning, implementation plans and the operative power to facilitate change (*ibid*:172). The cautions of Marschall and Shah (2005) about primary reliance on stakeholder processes are corroborated by evidence that the 2013 goals are not being achieved and by a lack of substantial public documentation on how targets are to be reached or plans are to be implemented. Many skeletal PowerPoint presentations can be sourced on H&S targets, produced by most stakeholders in the sector, but few public reports and even fewer peer-reviewed journal articles on practice or achievement were found. A further finding of the study was that the stakeholders in the mining sector do not provide transparent and public evidence of actual H&S training of mineworkers to support their positive public policy statements made regarding mine H&S training, which in turn has a negative effect on their credibility; and especially on research and development undertakings that are not managed by stakeholders in the sector, such as university-based and post graduate research.

### ***Pejorative tendencies***

Much of the literature reviewed in this study presents a very negative view. Many issues in mine H&S provoke negative observations and findings, such as the very bad occupational health situation of mineworkers, the poor safety record of South African mines, and the unclear policy and training responses. This negative tendency is quite pervasive. Even in the most sympathetic literature, the most vulnerable mineworkers are described with the use of generalizations and terms that are ultimately pejorative. In health promotion and H&S literature, South African mineworkers are subject to generalizations that describe them as ignorant, uneducated, traumatised, powerless, diseased and without judgment, self-esteem or self-control. Their behaviour is often generalized as being typically that of risk-taking philanderers who indulge in substance abuse, as well as acts of violence and intimidation. H&S culture in mining is described simply as bad. Both the negativity and the tendency to generalize about the personal attributes of several hundred thousand people are unhelpful in formulating valid training and awareness responses. Such underlying tendencies may be reminiscent of the redemptive tendency of adult education (O'Sullivan, 2008:29) and the more destructive ideological bias in research (Chilisa & Preece, 2005:236), discussed in Chapter 4.

In fact, covert attitudes and tendencies can be more difficult for adult learners to deal with than those that are overt. In Chapters 5 and 6, the work of Airhihenbuwa and DeWitt Webster (2004:7-12) is cited because it addresses the issue of negativity in health interventions and suggests that a conscious goal should be to not only focus on bad aspects of a situation but also to promote the good and recognize the unique or indifferent aspects (*ibid*:7). The study found that much of the H&S literature reviewed had a very negative tendency, which is unhelpful in two ways: it provides a dysfunctional base for formulating approaches to training mineworkers, and an excuse for people of influence in the mining sector to avoid responsibility for the H&S record.

## 7.5 Perspectives on the findings

### *Validity*

As stated before, the original proposal for this research included a limited pilot study, which was to test the contextual validity of the findings and conceptual framework. This would still be the ideal option, but would involve a primary research study in the workplace or interrogation of the findings with mineworkers, privileged observers, custodians of H&S training or other stakeholders. There does not seem to be a currently accepted term for the internal validity, credibility or truth of the study's findings. Brock-Utne (2008:10) described internal validity as 'how correctly the research portrays the phenomenon it is supposed to portray,' a challenge in the integration of different disciplines. Chilisa and Preece (2005) acknowledge the problems of confidence regarding accuracy and truth in qualitative research. They state: 'In qualitative research truth is multiple and subject orientated. Knowledge is therefore true to the extent that it represents the multiple realities, as revealed by the informants' (Chilisa & Preece 2005:235). This study does not consult informants directly, but makes use of multiple realities in its interdisciplinary approach. Many different perspectives on mine H&S are interrogated, and there are specific examples in the study where concepts and ideas relate directly to aspects of empirical research or reported experience. The findings in this study are composite ones, made after wide reading and deliberation, but they are made in a spirit of ongoing inquiry, research and development.

### ***Significance and operative power***

The significance of the findings above relates to its valid association with the topic and the context of mine health and safety training. This was discussed above and throughout the study. I do not officially represent any constituency, nor am I permanently employed by an influential agency or mining stakeholder. Spheres of influence in both AET and mine H&S training in South Africa are inevitably aligned to stakeholder constituencies, and adult educators do not constitute one that is recognized. Thus the sphere of influence of the findings of this study and their significance will depend on further work and writing. It was undertaken in a spirit of inquiry, and a key learning point was to find out how much could be learned from literature, even from an imperfect body of literature, and how much could be gained from interdisciplinary study.

### **7.6 Concluding comment**

#### ***Summarizing the findings***

It is necessary to summarize the many findings of the study before proceeding with the concluding section. The study found that the self-efficacy concept is valuable in informing approaches to mine H&S training, but nuanced engagement with the concept, the possible sources of its modification and the task and context-specificity of the specific type of efficacy under consideration is essential. However, review of the wider literature suggests that the H&S training of mineworkers may be better served by a research-based approach, informed by a number of concepts and theories, than by dependence on a single conceptual approach or framework.

Key considerations for formulating an approach to H&S training of mineworkers in the South African context are identified, regardless of the specific models selected. These are: new learning required; risk perception and management; existing and associated logics; team ethos; maintaining new learning and practice; and a dialogic aspect or space within the programme. New learning is required in H&S training, whether in the form of new content, skills, insights or behaviours. Strategies for the maintenance of such learning are also required.

Conventional risk assessment and management approaches could be enhanced by the integration of accurate risk perception approaches of health promotion studies. The investigation and acknowledgement of existing and associated beliefs, logics and practices of workers about the particular H&S issue under discussion are critical to facilitating and maintaining new learning and practices. A dialogic aspect to H&S training enhances the engagement of workers, provides opportunities for workers and other stakeholders to interrogate knowledge and beliefs, negotiate ways forward, challenge one another, and practise negotiating new attitudes and skills.

With reference to the current concern with H&S culture, the study has two findings. Firstly, a priority focus for such research is at the site of the work team ethos, because mineworkers operate in small teams in which H&S behaviour is most subject to positive or negative persuasion. Secondly, attempts to engage with such culture or ethos will be more effective when focused on positive or neutral aspects, rather than only on negative aspects.

The convergent effects of different policies affecting training of the most vulnerable mineworkers results in a situation where their health promotion and awareness is marginalized. H&S training is legislated in the MHSA, but compliance is virtually impossible to enforce. The logic of H&S training is most evidently linked to operator training and ABET. A lack of effective advocacy and training around critical, generic occupational hazards and risks, such as lung disease, is evident. National education and training policy is also unhelpful because unit standards-based policy places precedence on accredited training over advocacy and awareness programmes. Yet substantial numbers of mineworkers lack the educational scaffolding for NQF-linked qualifications and skills programmes. Their H&S training is left to the discretion of employers, and research has shown that such training is frequently not provided in the workplace. The proposed role of H&S representatives appears extremely demanding, and the associated skills training, outlined in public unit standards, lacks essential elements.

Finally, much of the literature reviewed has a negative tendency which is unhelpful in two ways: it provides a dysfunctional base for formulating approaches to training, and an excuse for people of influence in the sector to avoid responsibility for their H&S record.

### ***Critical perspectives***

The mining sector is still very powerful in South Africa, with the capacity to command its own policy and execute plans and even produce legislation. Yet the H&S training of mineworkers is not optimal or even adequate in its current form, especially for those who lack formal schooling. The discussion below aims to interpret the findings of the study into a few critical perspectives from the point of view of an adult educator. It ends with propositions regarding the H&S training for those mineworkers who are probably most vulnerable and neglected, yet constitute the largest categories of employees in the sector. The discussion starts at the core focus of this study and works outwards.

### ***Health and safety as a core focus***

There are essential problems with the stated focus on mineworker H&S and associated training. A lack of effective advocacy and training around critical occupational health problems, such as lung disease, is reported in current research (Murray et al., 2011:S71) and is evident in the literature reviewed. Occupational H&S as a subject or generic issue for mineworkers is quite neglected (Frankel, 2010:45; DME, 2008:39). The quality of training is a reported problem and its delivery to the most vulnerable workers is left to the discretion of employers. The appropriate delineation of H&S as focus, subject or learning area for the most vulnerable mineworkers requires intense analysis, research and development, with particular reference to those issues that are generic to many tasks and occupations, such as lung disease. This could include research focused on worker perspectives; establishing how learning can be assured in terms of the content required and in the context of learning; key considerations prior to training, such as those that emerged in this study: new learning required; risk perception and management; existing and associated logics; team ethos; maintaining new learning and practice; and dialogic space. Interdisciplinary and interdepartmental processes could initiate better research and development for H&S training.

Different kinds of dedicated and highly skilled professionals operate in H&S endeavours, in diverse fields and in disciplines such as medicine, pathology, mine engineering, geology and management. Such processes would require the working together of the most skilled practitioners in each relevant discipline, rather than only placing reliance on the bringing together of tripartite stakeholders.

### ***H&S training: A business opportunity***

The findings of this study, however, suggest that the training aspect of H&S still operates largely in the mode of a transient business opportunity, rather than a professional endeavour. Even the research reports of state-funded agencies are available at high prices. As a result, those in the sector who have the least economic power have seen their interests badly served, even in the post-apartheid era. There is scant evidence of the custodians or providers of their H&S training being subject to high standards of professional accountability. While working conditions and safety in mines have improved dramatically due to changes in labour policy and technological developments in recent years, occupational health has not. The current training approach often appears to be one of expedience, aimed at securing lucrative contracts from employers or sectoral training authorities.

### ***Professional research, development and accountability***

The literature frequently refers to the difficulty of accessing substantial research on H&S training provision. It is not possible to gauge whether the issue relates primarily to access issues or to the existence of such research. The competitive business bias of mine H&S inhibits access to research and the enabling of further research and development studies conducted by researchers who are not employed specifically in the sector, such as university departments. This includes post-graduate students employed in other institutions. The lack of public access to evidence of H&S training brings the transparency and accountability of the system into question. This could be addressed by all stakeholders in the sector. Furthermore, the credibility of different stakeholders in the sector can only be enhanced by public reporting.

### ***Training opportunities for workers who lack formal education***

There is discordance between the concern for mine H&S training frequently stated by the MHSA, which demands that all workers receive H&S training; and the national training policy of the NQF and associated levels and unit standards. Such NQF or unit standard-based skills programmes exclude the countless numbers of mineworkers who lack formal education, or the informal skills to cope with the RPL processes which would theoretically facilitate their inclusion. Other than formal ABET, training options for adults who lack formal schooling are unclear in South Africa.

Furthermore, the enduring logic that H&S can be addressed as a component of operator training is proving to be dysfunctional in addressing dire, generic occupational mine H&S problems such as lung disease. The H&S and other training options for mineworkers who are excluded by the NQF levels appear to be unregulated.

### ***Critical conclusions and propositions***

Consequently the study ends with six propositions as a positive contribution. These are made from the perspective of an adult educator.

*Proposition 1:* The most appropriate training or health promotion options for those H&S concerns that are generic to many tasks and occupations, such as lung disease, be investigated by professionals from all relevant disciplines and collated into an integrated plan for the most vulnerable mineworkers, by the relevant authority.

*Proposition 2:* Significant research relating to the H&S training of mineworkers, the content required, context of learning, perspectives of the workers themselves or other theoretical input, such as the five key considerations of the study, should be thoroughly investigated before H&S training programmes are funded.

*Proposition 3:* That the body perceived to be the highest authority on H&S training for mineworkers in the sector investigate the actual provision of H&S training and preparation for work of underground mineworkers; and that such information be freely available to researchers.

*Proposition 4:* The policy rationale and logic of the current mine H&S training system should be investigated and explicated by each and all of the relevant stakeholders and authorities, with substantial explanation about how the major threat to mineworkers, lung disease, is being addressed.

*Proposition 5:* Every opportunity should be used to publicize the predicament of countless mineworkers whose training (H&S and other) is marginalized because they lack the formal schooling (Grade 9) to cope with unit standard-aligned programmes, or lack the informal skills to be included via RPL processes.

*Proposition 6:* Public expenditure on mine H&S training and resulting programmes should become public information, available to all stakeholders, researchers and the public.

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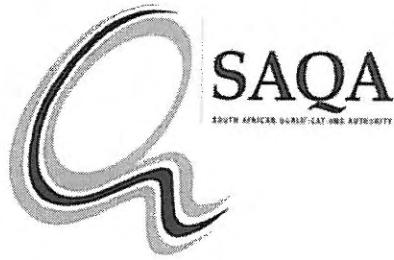
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## APPENDIX A

Level Descriptors for the South African National Qualifications Framework



# Level Descriptors for the South African National Qualifications Framework

November 2010

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## Purpose of level descriptors

1. The purpose of level descriptors for Levels One to Ten of the NQF shall be to ensure coherence across learning in the allocation of qualifications and part qualifications to particular levels, and to facilitate the assessment of the international comparability of qualifications and part qualifications.

## Definitions and context

2. In these level descriptors any word or expression to which a meaning has been assigned in the National Qualifications Framework Act (Act 67 of 2008) shall have such meaning and, unless the context indicates otherwise.
  - a. “applied competence” means the ability to put into practice in the relevant context the learning outcomes acquired in obtaining a qualification
  - b. “autonomy of learning” means the capacity of a learner for lifelong learning and includes the extent to which a learner can undertake action for learning independently, the extent to which a learner takes responsibility for his or her own learning and the extent to which a learner is self-reflexive about and can evaluate the quality of his or her learning and eventually that of others
  - c. “field” means a particular area of learning used as an organising mechanism for the NQF
  - d. “level” means one of the series of levels of learning achievement arranged in ascending order from one to ten according to which the NQF is organised
  - e. “level descriptor” means that statement describing learning achievement at a particular level of the NQF that provides a broad indication of learning achievements or outcomes that are appropriate to a qualification at that level

- f. "National Qualifications Framework" is a comprehensive system approved by the Minister for the classification, registration, publication and articulation of quality-assured national qualifications
  - g. "operational literacy" means an ability to use basic procedures and operations to complete complex tasks
  - h. "sub-framework" means one of three coordinated qualifications sub-frameworks which make up the NQF as a single integrated system: The Higher Education Qualifications Sub-Framework, the General and Further Education and Training Sub-Framework and the Occupational Qualifications Framework
3. Each level of the NQF is described by a statement of learning achievement, known as a level descriptor.
  4. There is one set of level descriptors for the NQF.
  5. The nomenclature for qualifications is dealt with in the sub-frameworks of the NQF.
  6. Contextual interpretation of the level descriptors within each of the three sub-frameworks is encouraged.
  7. In order to advance the objectives of the NQF, the South African Qualifications Authority is responsible for the development of the content of the level descriptors for each level of the NQF in consultation with the three Quality Councils: The Council on Higher Education, Umalusi and the Council for Trades and Occupations

### **Level descriptors**

8. A qualification or part qualification registered at a specific level of the NQF shall comply with the following categories of level descriptors.
9. NQF Level One

#### *Applied competence*

- a. a general knowledge of one or more areas or fields of study, in addition to the fundamental areas of study
- b. an understanding of the context within which the learner operates
- c. an ability to use key common tools and instruments
- d. sound listening, speaking, reading and writing skills
- e. basic numeracy skills including an understanding of the symbolic systems
- f. an ability to recognise and solve problems within a familiar, well-defined context
- g. an ability to recall, collect and organise given information clearly and accurately
- h. an ability to report information clearly and accurately in spoken and written form

*Autonomy of learning*

- i. a capacity to apply themselves to a well-defined task under direct supervision
- j. an ability to sequence and schedule learning tasks
- k. an ability to access and use a range of learning resources
- l. an ability to work as part of a group

**10. NQF Level Two**

*Applied competence*

- a. a basic operational knowledge of one or more areas or fields of study, in addition to the fundamental areas of study
- b. an understanding of the environment within which the learner operates in a wider context
- c. an ability to use a variety of common tools and instruments
- d. the ability to apply literacy and numeracy skills to a range of different but familiar contexts
- e. an ability to use their knowledge to select and apply known solutions to well-defined routine problems
- f. a basic ability to collect, organise and report information clearly and accurately
- g. an ability to express an opinion on given information clearly in spoken and written form

*Autonomy of learning*

- h. a capacity to work and learn in a disciplined manner in a well-structured and supervised environment
- i. an ability to manage their time effectively
- j. an ability to develop sound working relationships and an ability to work effectively as part of a group

**11. NQF Level Three**

*Applied competence*

- a. a basic understanding of one or more fields' or disciplines' key concepts and knowledge, in addition to the fundamental areas of study
- b. an understanding of the organisation or operating environment as a system
- c. application of skills in measuring the environment using key instruments and equipment
- d. operational literacy
- e. an ability to use their knowledge to select appropriate procedures to solve problems within given parameters
- f. a basic ability to summarise and interpret information relevant to the context from a range of sources
- g. an ability to take a position on available information, discuss the issues and reach a resolution

- h. produce a coherent presentation and report, providing explanations for positions taken

*Autonomy of learning*

- i. a capacity to operate within clearly defined contexts
- j. an ability to work and learn within a managed environment
- k. capacity to actively contribute to team effectiveness

**12. NQF Level Four**

*Applied competence*

- a. a fundamental knowledge base of the most important areas of one or more fields or disciplines, in addition to the fundamental areas of study
- b. an informed understanding of the key terms, rules, concepts, established principles and theories in one or more fields or disciplines
- c. an understanding of the organisation or operating environment as a system within a wider context
- d. an ability to apply essential methods, procedures and techniques of the field or discipline
- e. an ability to apply and carry out actions by interpreting information from text and operational symbols or representations
- f. an ability to use their knowledge to solve common problems within a familiar context
- g. an ability to adjust an application of a common solution within relevant parameters to meet the needs of small changes in the problem or operating context
- h. an ability to motivate the change using relevant evidence
- i. a basic ability in gathering relevant information, analysis and evaluation skills
- j. an ability to communicate and present information reliably and accurately in writing and verbally

*Autonomy of learning*

- k. a capacity to take responsibility for their own learning within a supervised environment
- l. a capacity to take decisions about and responsibility for actions
- m. a capacity to evaluate their own performance against given criteria
- n. a capacity to take the initiative to address any shortcomings they find

**13. NQF Level Five**

- a. *Scope of knowledge*, in respect of which a learner is able to demonstrate knowledge of the main areas of one or more fields, disciplines or practices, including an understanding of the key terms, concepts, facts, principles, rules and theories of that field, discipline or practice
- b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an awareness of how knowledge or a knowledge system develops and evolves within the area of study or operation

- c. *Method and procedure*, in respect of which a learner is able to demonstrate an ability to select and apply standard methods, procedures or techniques within the field, discipline or practice, and to plan and manage an implementation process within a supported environment
- d. *Problem solving*, in respect of which a learner is able to demonstrate an ability to identify, evaluate and solve defined, routine and new problems within a familiar context, and to apply solutions based on relevant evidence and procedures or other forms of explanation appropriate to the field, discipline or practice
- e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an ability to take account of, and act in accordance with prescribed organisational and professional ethical codes of conduct, values and practices and to seek guidance on ethical and professional issues where necessary
- f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate an ability to gather information from a range of sources, including oral, written or symbolic texts, to select information appropriate to the task, and to apply basic processes of analysis, synthesis and evaluation on that information
- g. *Producing and communicating information*, in respect of which a learner is able to demonstrate an ability to communicate information reliably, accurately and coherently, using conventions appropriate to the context, either in writing, verbally or in practical demonstration, including an understanding of and respect for conventions around intellectual property, copyright and plagiarism
- h. *Context and systems*, in respect of which a learner is able to demonstrate an ability to operate in a range of familiar and new contexts, demonstrating an understanding of different kinds of systems, their constituent parts and the relationships between these parts, and to understand how actions in one area impact on other areas within the same system
- i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to: assess his or her performance or the performance of others and to take appropriate action where necessary; and take responsibility for his or her learning within a structured learning process and to promote the learning of others
- j. *Accountability*, in respect of which a learner is able to demonstrate an ability to account for his or her actions, to work effectively with and respect others, and, in a defined context, to take supervisory responsibility for others and for the responsible use of resources where appropriate

14. NQF Level Six

- a. *Scope of knowledge*, in respect of which a learner is able to demonstrate: detailed knowledge of the main areas of one or more fields, disciplines or practices, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and theories of that field, discipline or practice; and knowledge of an area or areas of specialisation and how that knowledge relates to

- other fields, disciplines or practices
- b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an understanding of different forms of knowledge, schools of thought and forms of explanation typical within the area of study or operation, and an awareness of knowledge production processes
  - c. *Method and procedure*, in respect of which a learner is able to demonstrate an ability to evaluate, select and apply appropriate methods, procedures or techniques in processes of investigation or application within a defined context
  - d. *Problem solving*, in respect of which a learner is able to demonstrate an ability to identify, evaluate and solve problems in unfamiliar contexts, gathering evidence and applying solutions based on evidence and procedures appropriate to the field, discipline or practice
  - e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an understanding of the ethical implications of decisions and actions, within an organisational or professional context, based on an awareness of the complexity of ethical dilemmas
  - f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate an ability to evaluate different sources of information, to select information appropriate to the task, and to apply well-developed processes of analysis, synthesis and evaluation on that information
  - g. *Producing and communicating information*, in respect of which a learner is able to demonstrate an ability to present and communicate complex information reliably and coherently using appropriate academic and professional or occupational conventions, formats and technologies for a given context
  - h. *Context and systems*, in respect of which a learner is able to demonstrate an ability to make decisions and act appropriately in familiar and new contexts, demonstrating an understanding of the relationships between systems, and of how actions, ideas or developments in one system impact on other systems
  - i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to evaluate performance against given criteria, and accurately identify and address his or her task-specific learning needs in a given context, and to support the learning needs of others
  - j. *Accountability*, in respect of which a learner is able to demonstrate an ability to work effectively in a team or group, and to take responsibility for his or her decisions and actions and the decisions and actions of others within well-defined contexts, including the responsibility for the use of resources where appropriate

15. NQF Level Seven

- a. *Scope of knowledge*, in respect of which a learner is able to demonstrate: integrated knowledge of the main areas of one or more fields, disciplines or practices, including an understanding of and an ability to apply and evaluate the key terms, concepts, facts, principles,

rules and theories of that field, discipline or practice; and detailed knowledge of an area or areas of specialisation and how that knowledge relates to other fields, disciplines or practices

b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an understanding of knowledge as contested and an ability to evaluate types of knowledge and explanations typical within the area of study or practice

c. *Method and procedure*, in respect of which a learner is able to demonstrate: an understanding of a range of methods of enquiry in a field, discipline or practice, and their suitability to specific investigations; and an ability to apply a range of methods to resolve problems or introduce change within a practice

d. *Problem solving*, in respect of which a learner is able to demonstrate an ability to identify, analyse, critically reflect on and address complex problems, applying evidence-based solutions and theory-driven arguments

e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an ability to take decisions and act ethically and professionally, and the ability to justify those decisions and actions drawing on appropriate ethical values and approaches, within a supported environment

f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate: an ability to develop appropriate processes of information gathering for a given context or use; and an ability to independently validate the sources of information, and evaluate and manage the information

g. *Producing and communicating information*, in respect of which a learner is able to demonstrate an ability to develop and communicate his or her ideas and opinions in well-formed arguments, using appropriate academic, professional, or occupational discourse

h. *Context and systems*, in respect of which a learner is able to demonstrate an ability to manage processes in unfamiliar and variable contexts, recognising that problem solving is context- and system-bound, and does not occur in isolation

i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to identify, evaluate and address accurately his or her learning needs in a self-directed manner, and to facilitate collaborative learning processes

j. *Accountability*, in respect of which a learner is able to demonstrate an ability to take full responsibility for his or her work, decision-making and use of resources, and limited accountability for the decisions and actions of others in varied or ill-defined contexts

## 16. NQF Level Eight

a. *Scope of knowledge*, in respect of which a learner is able to demonstrate: knowledge of and engagement in an area at the forefront of a field, discipline or practice; an understanding of the theories, research methodologies, methods and techniques relevant to the field, discipline or practice; and an understanding of how to apply

- such knowledge in a particular context
- b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an ability to interrogate multiple sources of knowledge in an area of specialisation and to evaluate knowledge and processes of knowledge production
  - c. *Method and procedure*, in respect of which a learner is able to demonstrate an understanding of the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in a specialised field, discipline or practice
  - d. *Problem solving*, in respect of which a learner is able to demonstrate an ability to use a range of specialised skills to identify, analyse and address complex or abstract problems drawing systematically on the body of knowledge and methods appropriate to a field, discipline or practice
  - e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an ability to identify and address ethical issues based on critical reflection on the suitability of different ethical value systems to specific contexts;
  - f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate an ability to critically review information gathering, evaluation and management processes in specialised contexts in order to develop creative responses to problems and issues
  - g. *Producing and communicating information*, in respect of which a learner is able to demonstrate an ability to present and communicate academic, professional or occupational ideas and texts effectively to a range of audiences, offering creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context
  - h. *Context and systems*, in respect of which a learner is able to demonstrate an ability to operate effectively within a system, or manage a system based on an understanding of the roles and relationships between elements within the system
  - i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to apply, in a self-critical manner, learning strategies which effectively address his or her professional and ongoing learning needs and the professional and ongoing learning needs of others
  - j. *Accountability*, in respect of which a learner is able to demonstrate an ability to take full responsibility for his or her work, decision-making and use of resources, and full accountability for the decisions and actions of others where appropriate

17. NQF Level Nine

- a. *Scope of knowledge*, in respect of which a learner is able to demonstrate: specialist knowledge to enable engagement with and critique of current research or practices; and an advanced scholarship or research in a particular field, discipline or practice
- b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an ability to evaluate current processes of knowledge

- production and to choose an appropriate process of enquiry for the area of study or practice
- c. *Method and procedure*, in respect of which a learner is able to demonstrate a command of and ability to design, select and apply appropriate and creative methods, techniques, processes or technologies to complex practical and theoretical problems
  - d. *Problem solving*, in respect of which a learner is able to demonstrate: an ability to use a wide range of specialised skills in identifying, conceptualising, designing and implementing methods of enquiry to address complex and challenging problems within a field, discipline or practice; and an understanding of the consequences of any solutions or insights generated within a specialised context
  - e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an ability to make autonomous ethical decisions which affect knowledge production, or complex organisational or professional issues, an ability to critically contribute to the development of ethical standards in a specific context
  - f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate an ability to design and implement a strategy for the processing and management of information, in order to conduct a comprehensive review of leading and current research in an area of specialisation to produce significant insights
  - g. *Producing and communicating information*, in respect of which a learner is able to demonstrate: an ability to use the resources of academic and professional or occupational discourses to communicate and defend substantial ideas that are the products of research or development in an area of specialisation; and a range of advanced and specialised skills and discourses appropriate to a field, discipline or practice, to communicate to a range of audiences with different levels of knowledge or expertise
  - h. *Context and systems*, in respect of which a learner is able to demonstrate an ability to make interventions at an appropriate level within a system, based on an understanding of hierarchical relations within the system, and the ability to address the intended and unintended consequences of interventions
  - i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to develop his or her own learning strategies which sustain independent learning and academic or professional development, and can interact effectively within the learning or professional group as a means of enhancing learning
  - j. *Accountability*, in respect of which a learner is able to demonstrate an ability to operate independently and take full responsibility for his or her own work, and, where appropriate, to account for leading and initiating processes and implementing systems, ensuring good resource management and governance practices

**18. NQF Level Ten**

- a. *Scope of knowledge*, in respect of which a learner is able to

- demonstrate: expertise and critical knowledge in an area at the forefront of the field, discipline or practice; and the ability to conceptualise new research initiatives, and create new knowledge or practice
- b. *Knowledge literacy*, in respect of which a learner is able to demonstrate an ability to contribute to scholarly debates around theories of knowledge and processes of knowledge production in an area of study or practice
  - c. *Method and procedure*, in respect of which a learner is able to demonstrate an ability to develop new methods, techniques, processes, systems or technologies in original, creative and innovative ways appropriate to specialised and complex contexts
  - d. *Problem solving*, in respect of which a learner is able to demonstrate an ability to apply specialist knowledge and theory in critically reflexive, creative and novel ways to address complex practical and theoretical problems
  - e. *Ethics and professional practice*, in respect of which a learner is able to demonstrate an ability to identify, address and manage emerging ethical issues, and to advance processes of ethical decision-making, including monitoring and evaluation of the consequences of these decisions where appropriate
  - f. *Accessing, processing and managing information*, in respect of which a learner is able to demonstrate an ability to make independent judgements about managing incomplete or inconsistent information or data in an iterative process of analysis and synthesis, for the development of significant original insights into new complex and abstract ideas, information or issues
  - g. *Producing and communicating information*, in respect of which a learner is able to demonstrate: an ability to produce substantial, independent, in-depth and publishable work which meets international standards, is considered to be new or innovative by peers, and makes a significant contribution to the discipline, field, or practice; and an ability to develop a communication strategy to disseminate and defend research, strategic and policy initiatives and their implementation to specialist and non-specialist audiences using the full resources of an academic and professional or occupational discourse
  - h. *Context and systems*, in respect of which a learner is able to demonstrate: an understanding of theoretical underpinnings in the management of complex systems to achieve systemic change; and an ability to independently design, sustain and manage change within a system or systems
  - i. *Management of learning*, in respect of which a learner is able to demonstrate an ability to demonstrate intellectual independence, research leadership and management of research and research development in a discipline, field or practice
  - j. *Accountability*, in respect of which a learner is able to demonstrate an ability to operate independently and take full responsibility for his or her work, and where appropriate to lead, oversee and be held ultimately accountable for the overall governance of processes and systems.



**Short title**

19. This document must be referred to as the Level Descriptors for the National Qualifications Framework.

*End of document*



## APPENDIX B

South African Qualifications Authority, Registered Unit Standards Numbers: 259639, 259622, 244383.



[\[Registered Qual & Unit Std Home page\]](#) [\[Search Qualifications\]](#) [\[Search Unit Standards\]](#)



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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY**  
**REGISTERED UNIT STANDARD:**

**Explain basic health and safety principles in and around the workplace**

SAQA US ID	UNIT STANDARD TITLE							
259639	Explain basic health and safety principles in and around the workplace							
ORIGINATOR	ORIGINATING PROVIDER							
SGB Occupational Health and Safety								
QUALITY ASSURING BODY								
-								
FIELD	SUBFIELD							
Field 09 - Health Sciences and Social Services	Preventive Health							
ABET BAND	UNIT STANDARD TYPE	OLD NQF LEVEL	NEW NQF LEVEL	CREDITS				
Undefined	Regular	Level 2	NQF Level 02	4				
REGISTRATION STATUS	REGISTRATION START DATE	REGISTRATION END DATE	SAQA DECISION NUMBER					
Reregistered	2009-07-01	2012-06-30	SAQA 0480/09					
LAST DATE FOR ENROLMENT	LAST DATE FOR ACHIEVEMENT							
2013-06-30	2016-06-30							

In all of the tables in this document, both the old and the new NQF Levels are shown. In the text (purpose statements, qualification rules, etc), any reference to NQF Levels are to the old levels unless specifically stated otherwise.

This unit standard replaces:

US ID	Unit Standard Title	Old NQF Level	New NQF Level	Credits	Replacement Status
116527	Demonstrate knowledge pertaining to basic health and safety principles in and around a workplace	Level 1	NQF Level 01	2	Complete

**PURPOSE OF THE UNIT STANDARD**

This unit standard is for those people giving an induction of health and safety principles to new personnel and the person credited with this unit standard is able to explain the duties of both the employees and employers with regard to Occupational Safety and Health in the workplace. Learners will be able to understand the requirements that apply to persons entering the workplace and performing any duties therein as well as the requirements for the use of Personal Protective Equipment (PPE), housekeeping and emergency procedures that apply to the workplace.

The qualifying learner is capable of:

- Explaining both employer and employee duties with regard to occupational safety and health in the workplace.



- Explaining the general safety rules in a workplace.
- Explaining the use and application of Personal Protective Equipment in a workplace.
- Explaining the need for good housekeeping in the workplace.
- Explaining and applying emergency procedures in the workplace.

**LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING**

- Communication at NQF Level 1 or equivalent.
- Mathematical Literacy at NQF Level 1 or equivalent.

**UNIT STANDARD RANGE**

N/A

**Specific Outcomes and Assessment Criteria:****SPECIFIC OUTCOME 1**

Explain both employer and employee duties with regard to occupational safety and health in the workplace.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

The employer's duties are described with regard to occupational safety and health in the workplace.

**ASSESSMENT CRITERION 2**

The employee's duties are described with regard to occupational safety and health in the workplace.

**ASSESSMENT CRITERION 3**

The occupational health and safety representation structure and activities are described in terms of legislative requirements.

**ASSESSMENT CRITERION 4**

Hazards and associated risks in the workplace are identified and addressed to ensure the health and safety of themselves and other persons.

**ASSESSMENT CRITERION 5**

The importance of identifying hazards and risks in the working environment is explained in terms of the consequences to the employer and employees.

**ASSESSMENT CRITERION 6**

The reporting procedure of hazards and risks is described in terms of organisational policies and procedures.

**SPECIFIC OUTCOME 2**

Explain the general safety rules in the workplace.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

The requirements that apply to persons that may be medically and non-medically intoxicated are explained in terms of the consequences to general safety in the workplace.

**ASSESSMENT CRITERION 2**

Authorised access requirements to the workplace are explained in terms of legal and organisational requirements.

**ASSESSMENT CRITERION 3**

The use of motorised and mobile equipment in the workplace is explained in terms of legal and organisational requirements.

#### **ASSESSMENT CRITERION 4**

Lock out procedures in the workplace are explained in terms of legal and organisational requirements.

#### **ASSESSMENT CRITERION 5**

Symbolic and other signage applicable to the workplace is explained in terms of legal and organisational requirements.

#### **ASSESSMENT CRITERION RANGE**

Symbolic and other signage may include but is not limited to mandatory, information, warning signs and colour coding.

### **SPECIFIC OUTCOME 3**

Explain the use and application of Personal Protective Equipment in the workplace.

### **ASSESSMENT CRITERIA**

#### **ASSESSMENT CRITERION 1**

Specific workplace Personal Protective Equipment (PPE) requirements are explained in terms of the correct usage and application.

#### **ASSESSMENT CRITERION 2**

Maintenance and storage practices for PPE are explained in order to ensure functionality.

#### **ASSESSMENT CRITERION 3**

Reporting and replacement procedures of substandard PPE are explained in order to ensure functionality.

#### **ASSESSMENT CRITERION 4**

The importance of wearing PPE and the consequences of non-compliance are explained with in terms of the effects on employer and employees.

#### **ASSESSMENT CRITERION 5**

The limitations of PPE used in and around the workplace are explained in terms of its protective restrictions.

### **SPECIFIC OUTCOME 4**

Explain good housekeeping in the workplace.

### **ASSESSMENT CRITERIA**

#### **ASSESSMENT CRITERION 1**

The need for good housekeeping in the workplace is explained in terms of the impact on health and safety to people and the immediate environment.

#### **ASSESSMENT CRITERION 2**

Specific requirements pertaining to stacking and storage of materials are explained in terms of health and safety.

#### **ASSESSMENT CRITERION 3**

Demarcation and colour coding practices in the workplace are explained in terms of health and safety.

### **SPECIFIC OUTCOME 5**

Explain and apply emergency procedures in the workplace.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

Emergency escape routes, assembly points and refuge bays in the work area are explained according to the organisational emergency plan.

**ASSESSMENT CRITERION 2**

Emergency communication procedures in the workplace are explained according to the organisational emergency plan.

**ASSESSMENT CRITERION 3**

A simulated exercise of an emergency situation is planned and carried out to assess the response/reaction of all employees.

**UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS**

- An individual wishing to be assessed (including through RPL) against this unit standard may apply to an assessment agency, assessor or provider institution accredited by the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Any institution offering learning that will enable achievement of this unit standard or assessing this unit standard must be accredited as a provider with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Moderation of assessment will be conducted by the relevant ETQA at its discretion.

**UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE**

Knowledge and understanding of workplace health and safety requirements.

**UNIT STANDARD DEVELOPMENTAL OUTCOME**

N/A

**UNIT STANDARD LINKAGES**

N/A

**Critical Cross-field Outcomes (CCFO):****UNIT STANDARD CCFO IDENTIFYING**

Identify and solve problems pertaining to understanding basic health and safety principles in and around the workplace.

**UNIT STANDARD CCFO ORGANISING**

Organise and manage oneself and one's activities so that one is aware of all the rules and regulations that impact on safety and health in and around the workplace.

**UNIT STANDARD CCFO COLLECTING**

Collect, analyse, organise and critically evaluate information in order to make decision regarding responding to an emergency situation.

**UNIT STANDARD CCFO DEMONSTRATING**

Demonstrate an understanding of the world as a set of related systems where not understanding the basic health and safety principles in and around the workplace could have a devastating impact on both the employee and employer.


**QUALIFICATIONS UTILISING THIS UNIT STANDARD:**

	ID	QUALIFICATION TITLE	OLD LEVEL	NEW LEVEL	STATUS	END DATE	QUALITY ASSURING BODY
Core	66269	General Education and Training Certificate: Lumber Milling	Level 1	NQF Level 01	Reregistered	2012-06-30	FPMSETA
Core	67569	National Certificate: Electronics Manufacturing and Assembly	Level 2	NQF Level 02	Registered	2012-07-29	MERSETA
Core	74269	National Certificate: Occupational Health, Safety and Environment	Level 2	NQF Level 02	Reregistered	2012-06-30	As per Learning Programmes recorded against this Qual
Elective	80566	National Certificate: Contact Centre and Business Process Outsourcing Support	Level 3	NQF Level 03	Registered	2014-02-16	SERVICES
Elective	49795	National Certificate: Rail Construction and Maintenance	Level 3	NQF Level 03	Reregistered	2012-06-30	TETA

**PROVIDERS CURRENTLY ACCREDITED TO OFFER THIS UNIT STANDARD:**

This information shows the current accreditations (i.e. those not past their accreditation end dates), and is the most complete record available to SAQA as of today. Some Quality Assuring Bodies have a lag in their recording systems for provider accreditation, in turn leading to a lag in notifying SAQA of all the providers that they have accredited to offer qualifications and unit standards, as well as any extensions to accreditation end dates. The relevant Quality Assuring Body should be notified if a record appears to be missing from here.

**NONE**


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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY**  
**REGISTERED UNIT STANDARD:**

**Describe the functions of the workplace health and safety representative**

SAQA US ID	UNIT STANDARD TITLE							
259622	Describe the functions of the workplace health and safety representative							
ORIGINATOR	ORIGINATING PROVIDER							
SGB Occupational Health and Safety								
QUALITY ASSURING BODY								
-								
FIELD	SUBFIELD							
Field 09 - Health Sciences and Social Services		Preventive Health						
ABET BAND	UNIT STANDARD TYPE	OLD NQF LEVEL	NEW NQF LEVEL	CREDITS				
Undefined	Regular	Level 2	NQF Level 02	3				
REGISTRATION STATUS	REGISTRATION START DATE	REGISTRATION END DATE	SAQA DECISION NUMBER					
Reregistered	2009-07-01	2012-06-30	SAQA 0480/09					
LAST DATE FOR ENROLMENT	LAST DATE FOR ACHIEVEMENT							
2013-06-30	2016-06-30							

In all of the tables in this document, both the old and the new NQF Levels are shown. In the text (purpose statements, qualification rules, etc), any reference to NQF Levels are to the old levels unless specifically stated otherwise.

This unit standard replaces:

US ID	Unit Standard Title	Old NQF Level	New NQF Level	Credits	Replacement Status
116518	Conduct safety and health representation activities	Level 2	NQF Level 02	3	Complete

#### PURPOSE OF THE UNIT STANDARD

The person credited with this unit standard is able to understand the objectives and statutory requirements pertaining to health and safety in the workplace. The learners will be able to explain the rights, powers, functions and duties of the workplace health and safety representative and how any errant health, safety and environmental issues may be handled. Learners will also be able to participate in the safety, health and environmental structures and measure these activities according to health, safety and environmental requirements.

The qualifying learner is capable of:

- Describing the framework of workplace health and safety legislation pertaining to health and safety representatives.
- Explaining the specified requirements to conduct safety, health and environmental representation



activities at a working place.

- Addressing safety, health and environment related issues within their scope of authority.
- Complying with the activities within safety, health and environmental structures.

#### **LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING**

- Communication at NQF Level 1 or equivalent.
- Mathematical Literacy at NQF Level 1 or equivalent.

#### **UNIT STANDARD RANGE**

N/A

### **Specific Outcomes and Assessment Criteria:**

#### **SPECIFIC OUTCOME 1**

Describe the framework of workplace health and safety legislation pertaining to health and safety representatives.

#### **ASSESSMENT CRITERIA**

##### **ASSESSMENT CRITERION 1**

Definitions and terminology contained in the current legislation are explained in terms of specified requirements of the workplace.

##### **ASSESSMENT CRITERION 2**

The objectives of the relevant current legislation are described in terms of their impact on both employees and employers.

##### **ASSESSMENT CRITERION 3**

The importance of complying with the terms of the current relevant legislation is explained in terms of the consequences to health, safety, environment and production.

##### **ASSESSMENT CRITERION 4**

The statutory requirements applicable to a health and safety representative are explained in terms of their effect on the duties and functions.

##### **ASSESSMENT CRITERION 5**

The statutory requirements applicable to a health and safety committee member are explained in terms of their effect on the duties and functions applicable.

##### **ASSESSMENT CRITERION 6**

The statutory requirements of the employer are explained in terms of their effect on the functions, duties and responsibilities of the health and safety representative.

#### **SPECIFIC OUTCOME 2**

Explain the specified requirements to conduct safety, health and environmental representation activities at a working place.

#### **ASSESSMENT CRITERIA**

##### **ASSESSMENT CRITERION 1**

The specific functions and rights of the health and safety representative are explained in terms of the relevant legislation.

##### **ASSESSMENT CRITERION 2**

The importance and purpose of conducting safety, health and environmental representation activities are

explained in terms of the consequences to safety, health, environment and production.

### SPECIFIC OUTCOME 3

Address safety, health and environment related issues within the scope of authority.

### ASSESSMENT CRITERIA

#### ASSESSMENT CRITERION 1

Safety, health and environment related issues are dealt with at the appropriate level, according to specified requirements.

#### ASSESSMENT CRITERION 2

Facts related to safety, health and environmental issues are established from information obtained, using accepted data gathering methods.

#### ASSESSMENT CRITERION 3

Resolution of safety, health and environment related issues is attempted according to legislation and organisational policy and procedures.

#### ASSESSMENT CRITERION 4

The importance of resolving safety, health and environmental related issues is explained in terms of the consequences to health, safety, environment and production.

### SPECIFIC OUTCOME 4

Comply with the activities within safety, health and environmental structures.

### OUTCOME RANGE

Structures include those contained within the management systems of the organisation.

### ASSESSMENT CRITERIA

#### ASSESSMENT CRITERION 1

The extent of participation within safety, health and environmental structures, is explained according to legislative requirements.

#### ASSESSMENT CRITERION 2

Consultative requirements of the health and safety representative are described in terms of their impact on interested and affected parties.

#### ASSESSMENT CRITERION 3

The importance of participating in the activities within the safety, health and environmental structures is explained in terms of the consequences to health, safety, environment and production.

#### ASSESSMENT CRITERION 4

Participation in the activities of the safety, health and environmental structures are measured according to health, safety and environmental requirements.

### UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

- An individual wishing to be assessed (including through RPL) against this unit standard may apply to an assessment agency, assessor or provider institution accredited by the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.
- Any institution offering learning that will enable achievement of this unit standard or assessing this unit standard must be accredited as a provider with the relevant ETQA or an ETQA that has a Memorandum of Understanding in place with the relevant ETQA.

- Moderation of assessment will be conducted by the relevant ETQA at its discretion.

#### **UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE**

- Health, safety and environmental legislation and regulations pertaining to the specific workplace of the learner.
- The functions and duties of a health and safety representative.

#### **UNIT STANDARD DEVELOPMENTAL OUTCOME**

N/A

#### **UNIT STANDARD LINKAGES**

N/A

### **Critical Cross-field Outcomes (CCFO):**

#### **UNIT STANDARD CCFO IDENTIFYING**

Identify and solve problems pertaining to safety, health and environmental issues within scope of authority.

#### **UNIT STANDARD CCFO WORKING**

Work effectively with others when participating in the activities of the health, safety and environmental structures in the workplace.

#### **UNIT STANDARD CCFO ORGANISING**

Organise and manage oneself and one's activities on order to participate in the activities of the safety, health and environmental representative effectively.

#### **UNIT STANDARD CCFO COLLECTING**

Collect, analyse, organise and critically evaluate information which may be required in order to address safety, health and environmental related issues.

#### **UNIT STANDARD CCFO COMMUNICATING**

Communicate effectively with the stakeholders on matters related to the health, safety and environmental representative.

#### **UNIT STANDARD CCFO DEMONSTRATING**

Demonstrate an understanding of the world as a set of related systems where effective participation in the activities of the safety, health and environmental representative leads to a safer and healthier workplace.

#### **QUALIFICATIONS UTILISING THIS UNIT STANDARD:**

	ID	QUALIFICATION TITLE	OLD LEVEL	NEW LEVEL	STATUS	END DATE	QUALITY ASSURING BODY
Elective	74269	National Certificate: Occupational Health, Safety and Environment	Level 2	NQF Level 02	Reregistered	2012-06-30	As per Learning Programmes recorded against this Qual
Elective	78528	National Certificate: Chemical Operations	Level 3	NQF Level 03	Reregistered	2012-06-30	As per Learning Programmes recorded against this Qual

#### **PROVIDERS CURRENTLY ACCREDITED TO OFFER THIS UNIT STANDARD:**

*This information shows the current accreditations (i.e. those not past their accreditation end dates), and is the most complete record available to SAQA as of today. Some Quality Assuring Bodies have a lag in their recording systems for*



provider accreditation, in turn leading to a lag in notifying SAQA of all the providers that they have accredited to offer qualifications and unit standards, as well as any extensions to accreditation end dates. The relevant Quality Assuring Body should be notified if a record appears to be missing from here.

**NONE**

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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY**  
**REGISTERED UNIT STANDARD:**

**Conduct continuous hazard identification and risk assessment within a workplace**

SAQA US ID	UNIT STANDARD TITLE							
244383	Conduct continuous hazard identification and risk assessment within a workplace							
ORIGINATOR	ORIGINATING PROVIDER							
SGB Mining and Minerals								
QUALITY ASSURING BODY								
-								
FIELD	SUBFIELD							
Field 06 - Manufacturing, Engineering and Technology	Fabrication and Extraction							
ABET BAND	UNIT STANDARD TYPE	OLD NQF LEVEL	NEW NQF LEVEL	CREDITS				
Undefined	Regular	Level 2	NQF Level 02	2				
REGISTRATION STATUS	REGISTRATION START DATE	REGISTRATION END DATE	SAQA DECISION NUMBER					
Reregistered	2010-08-16	2012-06-30	SAQA 0480/09					
LAST DATE FOR ENROLMENT	LAST DATE FOR ACHIEVEMENT							
2013-06-30	2016-06-30							

In all of the tables in this document, both the old and the new NQF Levels are shown. In the text (purpose statements, qualification rules, etc), any reference to NQF Levels are to the old levels unless specifically stated otherwise.

This unit standard replaces:

US ID	Unit Standard Title	Old NQF Level	New NQF Level	Credits	Replacement Status
116655	Conduct continuous hazard identification and risk assessment within a workplace	Level 2	NQF Level 02	2	Complete

#### PURPOSE OF THE UNIT STANDARD

This unit standard will be useful for persons who are required to conduct continuous hazard identification and risk assessment within an underground working place to ensure a healthy and safe environment to work in.

People credited with this unit standard are able to:

- Explain the specified requirements pertaining to continuous hazard identification and risk assessment.
- Prepare for hazard identification.
- Identify hazards and assess risks.
- Initiate remedial and follow-up action.

The knowledge and understanding demonstrated within this unit standard contribute to social and economic transformation and the upliftment and economic growth of the mining and minerals sector by conducting



continuous hazard identification and risk assessment as part of the mining process.

This unit standard is intended to promote general knowledge and understanding of persons responsible for conducting continuous hazard identification and risk assessment in the mining and minerals sector in order to ensure knowledgeable, competent and informed workers.

### **LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING**

The credit calculation is based on the assumption that learners are already competent in terms of the following outcomes or areas of learning when starting to learn towards this unit standard:

- Follow basic occupational health and safety practices underground at NQF Level 1.

### **UNIT STANDARD RANGE**

Specific range statements are provided in the body of the unit standard where they apply to particular specific outcomes or assessment criteria.

## **Specific Outcomes and Assessment Criteria:**

### **SPECIFIC OUTCOME 1**

Explain the specified requirements pertaining to continuous hazard identification and risk assessment.

### **ASSESSMENT CRITERIA**

#### **ASSESSMENT CRITERION 1**

The explanation of the legal requirements in terms of the employer's responsibility to assess and respond to risk is consistent with specified requirements.

#### **ASSESSMENT CRITERION 2**

The legal definitions pertaining to hazard identification and risk assessment are explained.

### **ASSESSMENT CRITERION RANGE**

Definitions must include:

- Hazard.
- Risk.
- Occupational health.
- Reasonably practicable.
- Safety.
- Occupational health and Safety Committee.
- Tolerable risk.

### **ASSESSMENT CRITERION 3**

The explanation of the purpose of each type of hazard identification and risk assessment procedure is consistent with specified requirements.

### **ASSESSMENT CRITERION RANGE**

Procedures must include:

- Baseline.
- Issue-based.
- Continuous.

### **ASSESSMENT CRITERION 4**

The explanation of the main components of a continuous hazard identification and risk assessment procedure is consistent with specified requirements.

### **ASSESSMENT CRITERION 5**

The explanation of the importance of identifying, dealing with and reporting hazards in terms of the consequences to occupational health, safety, environment and production is consistent with specified requirements.

**SPECIFIC OUTCOME 2**

Prepare for hazard identification.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

The required personal protective equipment is available, in good working order, fit for purpose, and used in accordance with its design and specified requirements.

**ASSESSMENT CRITERION 2**

The identification of relevant documents to assist in identifying hazards is according to specified requirements.

**SPECIFIC OUTCOME 3**

Identify hazards and assess risks.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

Hazards are identified and risks are assessed according to specified requirements.

**ASSESSMENT CRITERION 2**

Identified hazardous conditions are recorded according to specified requirements.

**ASSESSMENT CRITERION 3**

Interpersonal interaction is positive, consistent with specified requirements and promotes effective teamwork.

**SPECIFIC OUTCOME 4**

Initiate remedial and follow-up action.

**ASSESSMENT CRITERIA****ASSESSMENT CRITERION 1**

The significant risks that were assessed from hazardous conditions are dealt with according to specified requirements in terms of promptness and order of significance.

**ASSESSMENT CRITERION 2**

Reports are completed and submitted according to specified requirements.

**ASSESSMENT CRITERION 3**

Follow-up action is initiated and implemented according to specified requirements.

**UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS**

- Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable achievement of this unit standard must be accredited as a provider through the relevant ETQA by SAQA.
- Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines and the agreed ETQA procedures.

**UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE**

The following embedded knowledge is addressed in an integrated way in the unit standard:

Procedures and techniques:

- Hazard identification and risk assessment techniques.

Regulations, legislation, agreements, policies, standards:

- Safety, occupational health and environmental legislation and regulations.
- Quality policies, standards and agreements.

Relationships, systems:

- Interpersonal interaction with team members.

### **UNIT STANDARD DEVELOPMENTAL OUTCOME**

N/A

### **UNIT STANDARD LINKAGES**

N/A

## **Critical Cross-field Outcomes (CCFO):**

### **UNIT STANDARD CCFO IDENTIFYING**

Identify and solve problems and make decisions using critical and creative thinking.

Note: The ability of the learner to understand the action to be taken should environmental conditions and personal acts not conform to standard.

### **UNIT STANDARD CCFO WORKING**

Work effectively with others as members of a team, group, organisation or community.

Note: The ability of the learner to understand the action to be taken to safeguard fellow workers against unsafe environmental conditions and unsafe acts.

### **UNIT STANDARD CCFO ORGANISING**

Organise and manage themselves and their activities responsibly and effectively.

Note: The ability of the learner to identify hazards and risks in an underground workplace and to understand the effects of sub standard conditions.

### **UNIT STANDARD CCFO COLLECTING**

Collect, analyse, organise and critically evaluate information.

Note: The ability of the learner to analyse and determine risks and deal with them accordingly.

### **UNIT STANDARD CCFO COMMUNICATING**

Communicate effectively, using visual, mathematical and/or language skills in the modes of oral and/or written presentations.

Note: The ability of the learner to effectively complete and submit reports will indicate his/her proficiency in effective communication.

### **UNIT STANDARD CCFO SCIENCE**

Use science and technology effectively and critically showing responsibility towards the environment and occupational health of others.

Note: The learner demonstrates an understanding of and ability to use advanced mining technology in terms of production, safety and communication.

### **UNIT STANDARD CCFO DEMONSTRATING**

Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

Note: The ability of the learner to act when and where required by understanding the implications and impact of his actions within the company.

#### QUALIFICATIONS UTILISING THIS UNIT STANDARD:

	ID	QUALIFICATION TITLE	OLD LEVEL	NEW LEVEL	STATUS	END DATE	QUALITY ASSURING BODY
Core	58739	National Certificate: Mining Operations for Underground Hard Rock	Level 2	NQF Level 02	Reregistered	2012-06-30	MQA

#### PROVIDERS CURRENTLY ACCREDITED TO OFFER THIS UNIT STANDARD:

*This information shows the current accreditations (i.e. those not past their accreditation end dates), and is the most complete record available to SAQA as of today. Some Quality Assuring Bodies have a lag in their recording systems for provider accreditation, in turn leading to a lag in notifying SAQA of all the providers that they have accredited to offer qualifications and unit standards, as well as any extensions to accreditation end dates. The relevant Quality Assuring Body should be notified if a record appears to be missing from here.*

1. A&R ENGINEERING & MINING SUPPLIES PTY LTD
2. ANGLOGOLD ASHANTI LTD - DIVISION WEST WITS
3. Barberton Mines (pty) Ltd (16/MQA/0049/AC3/041005)
4. Concor Projects (pty) Ltd
5. De Beers Consolidated Mines Ltd - Kimberley
6. DIGGERS TRAINING AND DEVELOPMENT SERVICES
7. DILOKONG CHROME MINE PTY LTD
8. DYNAMIC NEW APPROACH
9. ERGO MINING (PTY) LTD
10. FOSKOR Pty Ltd
11. GFBLA
12. Greenside Colliery/Anglo Operations Limited
13. I Campus
14. JIC MINING SERVICES PTY LTD
15. MANCAS CONSULTANCY CC
16. Marula PLATINUM (PTY) LTD
17. Mathome Training & Development
18. MINING COAL
19. NKOMATI MINE
20. NORTHAM PLATINUM LIMITED
21. PALABORA MINING CO LTD
22. Redpath mining (SA) Pty Ltd
23. Richtrau No 177 Pty Ltd t/a Bokoni Platinum Mines (Lebowa Platinum Min
24. SAMANCOR EASTERN CROME MINES
25. SANDVIK MINING & CONSTRUCTION (PTY) LTD
26. SENZEKO EXECUTIVE RISK CC
27. SHAFT SINKERS PTY LTD
28. SNOWDEN
29. Technology Risk Solutions
30. Thusang Metallurgical Engineering Training and Consulting
31. Top Performers For Africa Cc
32. Triton Training and Development
33. VENETIA MINE
34. VUSELELA EMPOWERMENT INSTITUTE CC
35. XTRACT TRAINING SERVICES (PTY) LTD
36. ZAAIMAN EXPLORATION DRILLING (PTY) LTD



## 37. ZINC CORPORATION OF SA LTD

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