

## *Changing Workplace Environments: Implications for Higher Education*

Hitendra Pillay

Gillian Boulton-Lewis

Lynn Wilss

*School of Learning and Professional Studies  
Queensland University of Technology*

*Industry today is driven by information, global competition and knowledge. These factors have led to continual changes in workplaces as organisations strive to remain viable. This study examined the nature of changes that occurred in two distinct organisations in Australia over two years. It also examined how workers are adapting to those changes in terms of learning, and considered what implications there are for higher education. The participants constituted 18 workers from a medical service industry and 19 workers from an engineering organization. The data were analysed qualitatively and results indicated several categories of change. It was also apparent that while much learning was occurring in the workplace, there was very little direct association between workplace learning and higher education for the workers in this study although several have degrees or have organised their own further study. Suggestions are made regarding the current practices in universities and workplace learning and for better collaboration. For example, universities need to develop closer ties with*

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Correspondence concerning this article should be addressed to Hitendra Pillay, School of Learning and Professional Studies, Queensland University of Technology, Victoria Park Road, Kelvin Grove, Brisbane, Australia, 4059. E-mail: h.pillay@qut.edu.au

*industry and curriculum models that prepare workers for ongoing changes in the workplace should be developed.*

*Key words: changing workplaces; higher education; workplace learning*

Traditional notions of education are no longer sufficient to prepare a workforce for a contingent and dynamic world. Currently, we live in an era driven by information, global competition and new technologies that are changing the way we think, live and work. The Industrial Revolution was built on machinery, skills and labour; however, the information and knowledge-based revolution of the 21st Century is being built on investment in intellect and creativity. New jobs are emerging which require a different set of knowledge, skills and attitudes. To cope with such changes we need continuous education and development of “the human mind and imagination” (Department for Education and Skills, 1998) which, to a large extent, is undertaken by higher education. The study reported in this paper explored the nature of changes associated with the knowledge-based era and how workers adapt to those changes. The identified changes are based on workers’ experiences in two different industries in Australia. The findings are significant in terms of current practices adopted by higher education institutions and they could inform future directions for dynamic, contingent and knowledge-driven workplaces.

### **Changing Workplace Practices**

As noted above, the contexts in which work is performed and socially positioned are undergoing considerable changes that are due to accelerated economic, technological and organisational developments. Changes in the workplace call into question our “conventional modern industrial understanding of work” (Casey, 1999). Casey conceptualised the transformation

of work environments as the computer revolution, the Information Age, or post-industrial society. Other factors that characterise the changing workplace include advanced manufacturing and globalisation of production. Some regard these factors as the emergence of the new economy (Jentzsch, 2001) or industry that is based on knowledge creation (Takeuchi, 1998). According to Davenport and Prusak (1998) knowledge-based activities are necessary to achieve a competitive advantage and Cormican and O'Sullivan (2003) maintain that successful companies today possess the ability to consistently generate new knowledge. Essentially, the ways in which people work and learn at work have been affected by information-based work practices. Matthews and Candy (1999) view the transition from the industrial era to the emerging "knowledge era" as involving moves from:

- routine work to complex tasks;
- sequential activities to parallel, iterative activities;
- narrow skills and knowledge to those that are specialised and deep; and
- gradual to rapid skill obsolescence.

The nature of these transitions means that workers of the knowledge era are required to think differently. For example, working on a routine task would require less cognitive effort than that needed to work on a complex task, similarly moving from narrow skills to specialised skills implies that a greater depth of knowledge and expertise is required. Organizational skills such as self-management as well as communication and analytical skills, problem solving, creative thinking and the ability to negotiate and influence are also growing in importance. Consequently, it has become necessary for workers to expand abilities to meet various new aspects of work through training processes aimed at up-skilling or multi-skilling (Casey, 1999). These new expectations have given impetus to workplace learning which is increasingly becoming the key to maintaining a competitive advantage for organisations and individuals. However, this does not suggest higher education institutions are becoming redundant to workplace learning. It provides new challenges for higher education to develop curriculum models that

will foster the development and continuous adaptation of emerging knowledge and skills caused by the changes noted by Matthews and Candy (1999).

## **Work-based Learning**

With the introduction of technological innovations, industrial globalisation and international competition during the 1980s and 1990s, employers and governments experienced pressure to devote greater time and investment to educate their employees. Some employers explored new ways to make learning available to workers (Gallacher & Reeve, 2000) as a means of investing in human capital. Human capital is defined by Takeuchi (1998) as comprising knowledge, skill, and innovativeness as well as the company's employees being able to meet set tasks. The increasing emphasis on learning at work has led to structural changes in the workplace, in some teaching and learning institutions, and within society over the past decade. As a consequence work-based learning has developed to become part of many work environments today. This is acknowledged by some (Cormican & O'Sullivan, 2003) as the emergence of *knowledge organisations*. Parallel to this, some universities have begun to award degrees that take into account performance in the workplace (Halliday & Hager, 2002). This represents a shift in focus from purely academic degrees to those that are integrated with workplace practices.

One significant component of changing work environments is the computer revolution. Computer technologies are pervasive in work environments and this has meant that workers must have competencies they previously may not have possessed. Workers must not only be "computer smart" they also need to continuously upgrade their knowledge as technology evolves to become increasingly sophisticated (Matthews & Candy, 1999). Further, Casey (1999) believes that workers must be willing and able to learn and perform new tasks, take on different roles and be easily redeployed in flexible new workplaces. These conditions have contributed to the creation of "knowledge workers" (Cormican & O'Sullivan, 2003). This is not to sug-

gest that manual workers have become redundant. They are still part of the workplace however as Casey points out they are fewer in number and the type of manual work they undertake has changed.

In Britain, Eraut, Alderton, Cole, and Senker (1998) investigated the development of knowledge and skills in workers and indicated that formal education and training accounted for only a small part of what they learned and used at work. Workers reported that they mostly learned through non-formal means which were neither clearly specified nor planned. In fact, Matthews and Candy (1999) reported that possibly as much as 90% of organisational learning occurred incidentally or adventitiously. The flow of information between multiple users in the workplace has created opportunities for innovative methods of information sharing, learning and growing together although this may be more practical than theoretical and in this sense it is limited.

## **Implications for Higher Education**

Part of the changing nature of work is that workers face career changes and workplace restructuring throughout their working life. This means they need continual learning to remain employable and competitive. The constructivist (Applefield, Huber, & Moallem, 2001) and situated cognition (Anderson, Greeno, Reder, & Simon, 2000; Brown, Collins, & Duguid, 1989) advocates argue that learning is most powerful when it is experienced in the context where it will be used. As Matthews and Candy (1999) and Brennan and Little (1996) observed much learning takes place as part of doing a job. At the same time a prerequisite for entry into many occupations is a formal university degree (Teichler, 1996). These factors along with the recognition and adoption of lifelong learning, the knowledge based economy and globalisation are, in part, contributing to a restructuring of education and training. However, the place of universities in the midst of these changes is as yet uncertain. While some universities do recognise and accredit workplace learning, Coffield and Williamson (1997) suggest that generally universi-

ties are not responding sufficiently to the technological and economic changes of the past 20 years.

In recognition of the changes in the workplace and the type of knowledge expected of new graduates there are moves to provide a more balanced approach to learning the new types of knowledge and skills. One means of achieving this is by contextualising university learning through work-based learning experiences. Gallacher and Reeve (2000) explain this as part of a wider set of changes to reform higher education to meet the needs of workers who on the one hand have limited time yet need to develop skills that are occupationally relevant. The knowledge associated with a work-based higher education course would be different from that of traditional university knowledge. The focus would include knowledge of practice (Boud & Solomon, 2001). Accordingly, higher education courses would need to be restructured to accommodate such knowledge.

Some changes in higher education have included vocationally oriented content and flexible delivery of courses. Billett (2002) noted that some educational programs incorporate workplace experiences so students can contextualise their learning and develop specific vocational skills. The success of such moves is dependent on higher education and workplaces developing a closer relationship and employers recognising benefits of investing in human capital. Brennan and Little (1996) depict this emerging relationship as holding implications for *dimensions of higher education relevant to work* including curricula, training and socialisation, and students' options; *linkages between higher education and work* such as the labour market and transition to life-long education and work, and *dimensions of work relevant to higher education*, for example, employment, quality of work and employment.

Given the above expectations, it would seem appropriate that higher education rethink aspects of teaching, curriculum, assessment and access if they are to complement the needs of changing workplaces. It is also the case that universities are no longer the only source of knowledge generation (Garrick & Clegg, 2000) which reinforces the contention that universities

should refocus in order to keep attuned with current developments in industry that may be driving innovation and knowledge creation. Gallacher and Reeve (2000) suggest that the content of university courses should be more relevant to the economy and accredited to a wide range of learning experiences, including experiential learning. Essentially higher education institutions could develop different conceptions of learning and knowledge that include “competence” and theoretical knowledge in the context of learning for the workplace.

## **Objectives of the Study**

The above literature indicates that workplaces have undergone transformations in recent decades. Many changes are attributed to the emergence of new technologies (Culley & VandenHeuvel, 2000; Ridoutt, Dutneall, Hummel, & Selby-Smith, 2002). However, technology has not been the only driving force behind changed work environments. It is important to determine the nature of changes that are occurring as this may affect worker participation in training and worker productivity. The ability of workers to recognise the changes and successfully embrace them is still being investigated. If workers are embracing change, we need to know how so that work environments can incorporate worker requirements in terms of upgrading skills and knowledge. This may have implications regarding work related issues such as flexible work arrangements, study leave or on-site courses. With these considerations in mind, this study set out to investigate the following questions in the context of two different work environments in Australia:

- What changes are occurring in contemporary workplaces?
- How are workers adapting to changes that are occurring in the workplace?
- What are the implications of changing work environments for learning?

The findings from this study will inform future directions in terms of types of knowledge and its creation, training initiatives and workplace learning in higher education.

## **Method**

The data presented here is from the first two years of a three-year, longitudinal study. Third year data had not been collected at the time of writing this paper. Qualitative methodology was adopted to investigate workers' views on changing conditions in the two workplaces under investigation as well as how they have adapted to the changed work environments. The methodology involved descriptive data collection from the workers in their workplaces which contributed to an overall understanding of the culture of the workplaces involved. Qualitative methodology also incorporates investigations that occur in natural settings or in context. This formed a significant part of this study as workers were interviewed in their work environments thus enhancing the ecological validity (Burns, 2000) of the study. Interviews were semi-structured and questions were derived from recent literature on workplace learning and training initiatives. Each worker was interviewed twice, once each year in order to determine if any changes had occurred during the year and also as a means of validating the first year data (Creswell & Miller, 2000; Morse, Barrett, Mayan, Olson, & Spiers, 2002).

## **Sample**

The sample consisted of two cohorts of workers. One cohort was from a large private hospital and included administrative, educational, diagnostic and health personnel and security staff. The other, from a public transport company, constituted train drivers, train terminal operators, administrative staff and maintenance workers. In the first year 40 workers participated, this comprised 20 from each workplace. In the second year 37 workers, 18 from the hospital and 19 from the transport company, participated. In the second year, for the rail company 9 workers were under 40 years of age and 10 were older than 40 years and 16 were male and 3 were female. In the hospital 8 workers were under 40 years of age and 10 were over 40 years; 7 were male and 11 were female.

The sample selection was, in part, purposeful (Guba & Lincoln, 1989),

as the workers came from two organizations that had different cultures. These different organizational cultures may have influenced the changes that were occurring and how the workers adapted to these changes. Workers from both organisations had a range of educational qualifications that included diplomas and bachelor's degrees to postgraduate degrees. In the rail company one train driver had a Diploma in Business Management and two others, a driver trainer and a terminal operator had degrees, one worker had completed a diploma at TAFE while several of the workers had done work-based training that was provided by the company. This included computer courses, machinery ticketing, and station master courses. Some of the train drivers had previously completed a trade qualification. In the hospital eight workers had degrees, three had completed certificates at TAFE and several had undertaken computer courses and security training that were provided by the hospital. Sampling was also convenience (Gall, Borg, & Gall, 1996) based on accessibility and willingness of the workers to participate. Table 1 summarises the sample according to their identification (for example S1 for Subject 1), age (whether they were under or over 40 years of age), their workplace, level of work (manager, blue-collar or white-collar) and their education and training.

The hospital experienced a major restructure during the life of the study. This resulted in some policy changes and a new CEO and according to one worker there were cultural changes within the organisation. Associated with the restructures were changes in senior management. In fact one manager reported that he had experienced five different bosses in the last three years. There was also increasing pressure on cost centres to manage their own resources. Doctors are increasingly responsible for costing of services and some nurses' roles have changed from clinical to managerial. The transport company had undergone three takeovers with the most recent one by a corporation which resulted in the company becoming privately run. One worker felt this meant that "people are going to be more customer-focussed and revenue-based". Overall this company had moved from being wholly public to a private entity. Associated with this is a change from a rail-only

**Table 1 Sample by Age, Workplace, Level of Work and Education and Training**

ID	Age	Workplace	Level of Work	Education and Training
1	>40	Rail	Blue-collar	WBT, TAFE
2	>40	Rail	Manager	WBT, Studying Masters Degree; B.A.; Diploma
3	>40	Rail	Blue-collar	WBT, Diploma. Bus. Management from university
4	>40	Rail	Blue-collar	NFQ, WBT
5	>40	Rail	Blue-collar	NFQ
6	>40	Rail	Manager	WBT, TAFE
7	>40	Rail	Manager	NFQ, WBT
8	>40	Rail	Blue-collar	NFQ, WBT
9	>40	Rail	Blue-collar	NFQ, WBT
10	>40	Rail	Blue-collar	Diploma. Bus. Management from university
11	<40	Rail	Blue-collar	NFQ, WBT
12	<40	Rail	Blue-collar	NFQ, WBT
13	<40	Rail	Blue-collar	NFQ, WBT
14	<40	Rail	Blue-collar	NFQ, WBT
15	<40	Rail	White-collar	NFQ, WBT
16	<40	Rail	Manager	NFQ, WBT
17	<40	Rail	White-collar	NFQ, WBT
18	<40	Rail	White-collar	NFQ, WBT
19	<40	Rail	Manager	NFQ, WBT
20	>40	Hospital	White-collar	Did 2 years at College Business course
21	>40	Hospital	Manager	WBT, B.A.
22	>40	Hospital	Manager	B. Science; Dip. Teaching
23	>40	Hospital	Manager	Studying for PhD; MBA; Degree
24	>40	Hospital	Manager	Degree
25	>40	Hospital	Manager	Degree
26	>40	Hospital	Blue-collar	NFQ, WBT
27	>40	Hospital	Blue-collar	TAFE
28	>40	Hospital	Manager	WBT, Studied towards MBA, didn't finish
29	>40	Hospital	Manager	PhD; B. Physiotherapy
30	<40	Hospital	White-collar	NFQ, WBT
31	<40	Hospital	White-collar	WBT, Degree
32	<40	Hospital	White-collar	NFQ, WBT
33	<40	Hospital	White-collar	WBT, Degree
34	<40	Hospital	White-collar	TAFE
35	<40	Hospital	White-collar	WBT, TAFE
36	<40	Hospital	White-collar	WBT
37	<40	Hospital	Manager	WBT, Diplomas

WBT: Work-based training

NFQ: No formal qualifications

operation to include shipping and road transport. This brought a wider range of employment opportunities but also some challenges. The restructures have resulted in downsizing of staff and the loss of some senior managers in both organisations.

**Procedure**

The primary source of data collection was interviews. Each year, each participant was interviewed for approximately an hour to discuss his or her experiences of work. A number of probe questions were used to stimulate their thinking about work, their work processes and their perception of the culture of work. The questions were based on reading of relevant literature, the objectives of the study and issues relevant to workplaces today. Workers were asked about their past work experiences including training, what their job entailed, the competencies they needed to carry out their job, how they acquired their skills or competencies, if there had been any changes to the tasks they undertook or to their work role, how they had coped or adapted to changes in their work, and what work meant to them.

**Data Analysis**

Qualitative analysis procedures were used to make sense of the data. Initially the interviews were transcribed and all data were de-identified by using a case number, for example S1, for each worker (Berg, 1998). This ensured a confidential set of records. The researchers read all the transcripts in order to gain an overall understanding (Strauss & Corbin, 1998) of the workers' experiences and thoughts about work and the changes they had experienced in their working life. Following this the transcripts were searched systematically for conforming as well as nonconforming data as two researchers and a senior research assistant repeatedly and thoroughly read the entire data set. They then developed categories relating to changes that have occurred in the workplace. The analysis was an iterative process that involved several meetings of the research team and revisiting of the transcripts in order to discuss and modify the categories. This process ensured the validity of the categories (Creswell & Miller, 2000; Morse et al., 2002) which are explained below along with excerpts from interview transcripts that illustrate and further validate each category. The excerpt is identified by subject ID number, their workplace and work level in brackets.

## **Results**

Several categories of change in the workplace were evident. The most often mentioned aspects of change related to “technology” and “new positions and skills”. Most workers accepted that change was a part of the work culture today and while several reported positive aspects to change not all workers shared this view.

### **Acknowledging Change**

Several workers stated that they were aware of the constant and ongoing nature of change that they believe currently exists in their workplace. Some spoke of change occurring on a daily basis with some of these workers noting that it was necessary to accept, adapt to, or manage change. The implication for not adapting to change for one worker was being left behind or unemployed. There was also a sentiment in the workers’ comments that change would continue to be a part of the workplace as jobs never stay the same.

...nothing remains in concrete around here everything changes daily... one must adapt to change. (S36, Hospital, White-collar)

Change is one of those things that we’ve got to deal with everyday and everyday you come in here and there’s something new... change is something you’ve got to learn to live with and deal with it or manage it. (S14, Rail, Blue-collar)

...you’ve got to accept it, if you don’t go into the work environment these days expecting change or accepting it well you’re just going to be left sitting on the corner I think... this place is evolving all the time. (S12, Rail, Blue-collar)

### **Workers’ Attitudes to Changes**

There were positive and negative aspects to the workers’ attitudes to changes that were occurring in the workplace. Some workers expressed concern that changes had resulted in less job security. There was also recognition of the need to hold on to your job as the job market in general was shrinking. One worker was aware of pressure in workplace relationships and an overall loss

of enthusiasm, particularly for older workers, was evident. On the other hand there were positive aspects to change as some workers felt that changes had brought about a sense of pride in the work that was done as well as a renewed tolerance from employers towards employees.

Nowadays people are that frightened of losing their jobs. They are prepared to put those hours in just to make themselves look good and to keep their jobs because they know there's nothing out there. People I know in our area have gone under because of the stresses, they just can't put up with it. (S7, Rail, Manager)

I think a lot of enthusiasm has gone... the older ones they just sit in front of their desks and do your job. Now it's more or less the boss is here and the workers are here. The blokes have lost a lot of enthusiasm and that's a shame because I think that was one of the biggest assets. (S9, Rail, Blue-collar)

Yeah, and I think there's more pride from the job because there is so much emphasis on train handling now and fuel saving is a big thing. (S12, Rail, Blue-collar)

## **Technology**

The most consistently mentioned theme in regard to changes in the workplace concerned technology. In most instances workers favoured the changes that resulted from computer related technologies stating that work was now more efficient, quicker and not as tedious. It was apparent that a range of technologies was in place including computers, various software, computerised train engines and associated machinery, and closed circuit monitoring of security systems. Comparisons were made between the old and new technology driven ways of conducting business. For example email was viewed as a more efficient means of reaching people. Several workers stated that along with the new technologies came the need to continually upgrade their skills through training while others mentioned the benefits of having undertaken IT studies at university.

...a new technology comes out and then it tends to arrive on the scene a lot quicker these days. ...you know how to use the Internet and use it reasonably

well... need to know how to reach websites, have your name on mailing lists... need skills to manipulate a very large body of information. (S25, Hospital, Manager)

...while I was at university I did some IT subjects that definitely helped. (S6, Rail, Manager)

...now we've got more computer systems, more tracking systems, more procedures in place, we've got like more automatic weighing bridges now, information is stored in the computer, forklifts — now we've got computers in all machinery, electronic readers so we can pick up wagons in most places in Australia whereas before it was the old pencil and paper... We're always getting new machinery, better equipment, better computers — so it's new skills and a new learning curve they've got to go through. (S3, Rail, Blue-collar)

## **Restructuring**

For the most part, the restructuring that had taken place in both workplaces was spoken of in positive terms. It was also noted that both workplaces had undergone more than one restructure in recent years. The workers' reported changes in leadership, new departmental policies, different organisational structures and changed directions. They also stated that there was greater accountability and visibility regarding outcomes. Overall, cultural changes were strong in both workplaces and a theme of organisations becoming larger while staff were downsized ran through the workers' statements. Not all workers were happy about the implications of restructuring as some stated there was less cohesion, greater frustration and more required of workers.

...it's become a corporate health service now... the modus operandi of the department has changed dramatically, we have a whole new set of policies that only came out four weeks ago, departmental policy, a lot of changes on those. The whole health care system here within the hospital has changed dramatically, I'll say for the better. (S26, Hospital, Blue-collar)

The job is changing. They wanted to do a restructuring and upgrade the standard of health and safety... getting procedures in place, getting the training so the managers know how to apply the procedures. This place has gone through restructuring two times, a lot of changes in leadership, the executive. So it's

probably been unstable for staff, a lot of frustrations. We are starting to get a consistent direction, which makes life easy for everybody. We are starting to get visibility in terms of what we are doing, outcomes... the most significant one is cultural change. (S28, Hospital, Manager)

...we are going from being a purely Government base to being a Corporation, now to a private entity and going from a pure rail base and now with the new owners being in ships and road transport I think it's opening up a wide door and if we do it right we've got a great future to look forward to. (S3, Rail, Blue-collar)

The following five categories are evidence of ensuing changes due to the restructuring that had occurred in both workplaces. As such we regard them as sub-categories of restructuring. They are finance/budgeting, new positions/skills, workload/efficiency, training, and workplace health and safety.

#### *Finance/budgeting*

Two aspects of financial or budgeting changes were spoken of. One related to there being a greater focus on money and that money flow was much tighter and the other concerned devolution of budgets. One worker spoke of the devolution meaning that there was greater understanding and accountability regarding how money was spent and this in itself led to greater discretion in terms of spending.

Health had gone through a huge change, I mean we've gone from that absolute, there's this endless bucket of money of public health, we're in public and private health. We've learnt in the last 5 or 10 years about the fact that the dollars just can't keep being endless, we've actually had to get more efficient, more accountable... that's been a big change, this corporation in the last 5 to 10 years has also devolved its responsibility in accounting so line manager and middle managers are far more responsible for their budget, management performance. (S29, Hospital, Manager)

We used to balance the budget but it's really devolved down. When the new CEO came on board it devolved completely out to cost centres and it's been good and bad, um it's set up tribal instinct, this is mine that's yours but it's given the people who actually make the decisions on the floor and order the

equipment they now are accountable for it and understand the costs of actually what they do, that's been the biggest change in the last couple of years. (S37, Hospital, Manager)

### *New positions/skills*

A result of restructuring has been the creation of new positions and new skills for some of the workers. This was acknowledged in ways such as a “new format of the hospital” and with that “my portfolio changes on a regular basis”. Others experienced expanded roles in addition to the work they were currently undertaking. For the train drivers there was recognition of the fact that driving trains was no longer their only duty. They were now responsible for some administrative tasks, maintenance and rationalising fuel costs. As one driver stated, “...yeah, this ability to do a lot of other stuff”. Having to be multi-skilled was recognised widely as a result of amalgamating jobs and restructuring. For several workers, new positions, new skills and new responsibility meant they needed to develop new knowledge and this meant that training was necessary. However, it was evident that sometimes this was not provided and workers had to find ways to develop the skills themselves. Some achieved this by undertaking university study. For example one train driver had studied at university for a Diploma in health and safety, a Bachelor of Arts and currently he was studying for a Masters degree in corporate management. An administrator in the hospital was studying for two diplomas; one in management and one in business.

The size of the train — used to be 350 metres in length and they were about 500, 600 tonne and now they are about 1200 metres in length. So it's a big learning curve that we've taken and there's virtually been no training for that. You've got to think and plan further in advance. (S1, Rail, Blue-collar).

The only thing constant (about rail company) is the change and it means acquiring new skills and anybody who is not prepared to acquire new skills gets left behind. We do our own pays, we've got committees for rosters, for accommodation, so you have to sort of remove yourself from the role of the old

traditional train driver, that's all he did was jump in the train and drive a train from A to B. But now the whole idea is to put a lot of thought to what you are going to do, use momentum, running and reduce the fuel costs. (S12, Rail, Blue-collar)

...secretarial role is gone. It's amalgamated into a lot of other things... you do everything, you have to know multi-skilling. (S20, Hospital, White-collar)

### *Workload/efficiency*

Associated with the previous category, new positions/skills, were changes to the workload and the expectation of greater efficiency. All references to workload were in terms of increases or having to do more "with less or the same". For example one worker stated that the changing systems meant working smarter and harder. The need for greater efficiency was spoken of in terms of having to develop new skills. Train drivers, for instance, were expected to be more fuel efficient which meant developing new ways of driving a train. Some mentioned that there were inherent stresses associated with increased workloads and this often stemmed from having to work longer hours and within tighter timeframes.

...changing the way systems function... see if they can work smarter and harder... looking at shortening the process loops. I might work 8 till 5 here then I go home and work 8 till 12. ...more hours during the week are actually devoted to doing work activities. The main change at work would be shorter timelines. ...a lot stronger focus on how much things are going to cost. (S25, Hospital, Manager)

Fuel conservation... your road knowledge... so you're constantly trying to improve your driving style to get good fuel readings... try to get as much out of you as they can... it's getting tougher, more productive sort of thing... you've got to be really on the ball, it's completely different. (S11, Rail, Blue-collar)

### *Training*

Methods of training in the workplace have changed. For one train driver this was due to increased technology as simulators became a part of the training process. However, this was not a preferred method of training for

this driver. On the other hand, another driver felt that training methods were now more efficient as they were more structured compared to the training he had experienced.

As mentioned earlier, some workers had completed degrees or were currently studying for a degree at university. For example, a graduate trainee in the transport company stated that she tried to use the skills she learnt at university in her work, “while I was at university there was no practical experience ... but now I go back into the text books... now I’m like ‘Wow’ it can be used.” Another transport worker had started a degree which she said gave her a basic understanding and motivated her. Although, she added that the degree was too long and that she preferred short courses that were offered through private colleges.

We’ll see now they have started the system where they got a simulator and they’ve tried that but it’s not working. They’ve taken blokes off the street and then give them 12 months. They put them through 6 months of training and then they put them 6 months out with a driver, that’s only for the electrics. You see it’s just not working, they are getting about 10% out of what they know. (S5, Rail, Blue-collar)

I was 11 years fireman/acting driver before I finally got my driver’s appointment. Now they are taking them off the street and turning them around maybe one, two years. So now there is a much better structured training. Selection process I believe is probably better, like they are targeting people with the mindset that they want. (S10, Rail, Blue-collar)

### *Workplace health and safety*

Workers explained that there was greater emphasis on health and safety in the workplace. This was a recent change as workers reported that many health and safety procedures that existed now were not in place 6 years ago. The need to upgrade health and safety issues due to restructuring was also mentioned.

They wanted to do a restructuring, upgrade the standard of health and safety. (S28, Hospital, Manager)

Eight or 9 years 10 years later, then they emphasised more on safety with high visibility clothing, footwear, hats, long sleeve shirts, stuff like that, ... in the old days it was... safety was sort of up to you. (S12, Rail, Blue-collar)

## **Discussion**

This study investigated changes that were experienced by two cohorts of workers in two different work organisations. While our sample was small and we cannot generalise from our findings, several factors indicate that the changes may also occur in other similar organisations. For example, even though the workers were from quite different industries, the nature of changes that was evident was common to both. This is evidenced in the extracts from workers' statements about change. Further to this, the changes were pervasive across the levels of workers, that is from managers to blue and white-collar workers. When changes are viewed from the workers' perspective, as is the case in this study, they add to our understanding of how the issues related to changes may influence institutions of learning such as higher education. Yet, one of the most significant findings of this study was that while workers were aware of changes occurring in their workplaces, the same could not be said about corresponding changes to workplace learning initiatives or of links between learning required for work and higher education. Following is a discussion of the implications of changed workplace environments, learning, and the subsequent relationship with higher education.

Many of the categories of change that were identified above have been recognised by others. For example, Matthews and Candy (1999) acknowledged the impact of technology in work environments; Casey (1999) recognised that workers should be multi-skilled; and Rogers (1999) acknowledged that workplace change included restructuring, reorganisation of management structure, and introduction of new equipment or technology. While some of the deployments and changes that occurred in the workplaces in this study were by choice, others were due to restructuring and takeovers.

Thus workers now require more diverse yet contextual knowledge and skills and they must think differently in workplaces that now depend on knowledge rather than skills (Cormican & O'Sullivan, 2003). There is also increasing recognition that workers should understand theoretical as well as practical knowledge. For example, this was evident when train drivers stated they now not only drive computerised trains but they also have to account for fuel efficiency as well as manage their track teams. Consequently they must rationalise their actions which calls for different ways of thinking and different knowledge types than traditionally train drivers may have developed. This is possibly what led two of the train drivers to undertake management courses at university. This presents a dilemma for training in how to deal with the diversity of theoretical and practical knowledge and at the same time provide contextual knowledge.

A category that generated many comments was the impact of technology on the workplace. The workers recognised advantages of Interactive Computer Technologies (ICTs) in their workplace and that use of ICT is more about application than programming. Matthews and Candy (1999) advocated computer knowledge for workers as well as the fact that workers should continually upgrade this knowledge. However, universities usually assume that students learn computer application skills through an immersion approach while studying different subjects. It appears from the responses of the workers in this study that there is a need to make a more deliberate embedding of ICT application skills in university subjects. This is particularly important for continuous professional development programs where many older workers participate and for those who may not have had the opportunity to learn about ICT during their formal training. This may also address Coffield and Williamson's (1997) contention that universities are not responding sufficiently to technological changes.

The findings also indicated that new jobs and new ways of doing old jobs are emerging. In other words the "new economy" (Jentzsch, 2001) is becoming more pervasive. For example, traditional supervisory positions did not include financial and budgeting responsibilities yet, today they do. With the

devolution of responsibilities to local cost centres the role of traditional line managers has also changed. Together with budget responsibilities comes learning associated with new integrated management and financial softwares. Devolved responsibilities have also seen an emphasis on workload planning and efficiency. This, in some cases, has meant working longer hours and within tighter timeframes. Many workers reported undertaking work-based training (refer to Table 1) to accommodate this new knowledge; however, undertaking courses at university was limited. This challenges universities to reconceptualise professional skills and knowledge for future degree programs and make them available in more flexible forms (Boud & Solomon, 2001). It also suggests that academics may want to reconceptualise their roles in order for them to be able to deal with the new expectations of industry. However, it must be acknowledged that some universities are addressing the new expectations and this is evident in programs such as the MBA.

Traditional models of curriculum development are being challenged. Accordingly, higher education curriculum and pedagogical models that will prepare a dynamic and contingent workforce are required. However, there are no patterns that are static long enough to be recognised in emerging work practices, patterns that in the traditional curriculum models assisted in developing educational programs. Despite inherent difficulties associated with a dynamic and contingent workforce (such as those caused by three takeovers within three years in one of the organisations in this study), some workers in this study seem to have adopted professional development models and participated in work-based training that have successfully assisted them to transform their knowledge and skills rapidly as changes occurred. Yet, these abilities do not formally articulate to higher education.

A recent initiative in terms of the history of workplaces is occupational health and safety. Often this is an additional responsibility for workers. While universities may have degree programs in occupational health and safety, such skills are not embedded in other professional programs. Gallacher and Reeve (2000) reported that higher education should be reformed to produce a workforce with occupationally relevant skills. This would seem to be true

in the area of workplace health and safety which could be embedded in some programs.

The results of this study indicate that the skills and knowledge required of workers have changed yet tertiary programs that accommodate new skills and knowledge are limited. As stated earlier, some of the workers in this study had undertaken university degrees to meet challenges of the changing workplace and in doing so they were able to further their careers. However, there were also workers who had started degree course but did not finish them. They stated that the courses were too long or too theoretical. This again challenges universities to rethink the structure of their curriculum in some cases. This is particularly true as workers of the knowledge era are required to undertake tasks that are different from previous eras (Matthews & Candy, 1999) and in doing so they are required to think differently.

## **Conclusion**

The results of this study showed that workers recognised change as a part of the workplace and this has seen an emerging willingness for many of them to engage with the changes and undertake education and training to maintain their employability. Casey (1999) noted that contemporary workers need to continue learning in flexible work environments and further, that they should be ready for redeployment. The willingness of some workers in this study to engage with change can be attributed to their positive attitudes towards change while in some cases it was due to a fear of losing their jobs and becoming unemployable. In either case, workers should continually upgrade their skills and knowledge and this holds implications for training including higher education.

Increased work-based training and other formal training undertaken by workers would suggest a potential market for universities. The results of this study imply that instead of selling degrees as products in themselves there is potential to design flexible programs as ongoing and evolving pro-

fessional development. This could be in the form of modular courses that repackage the theory behind practical knowledge and articulate to workplace skills. The courses could also accredit performance in the workplace (Halliday & Hager, 2002). They could impart the knowledge associated with multi-skilling and multi-tasking that workers in contemporary workplaces require and the workers in this study stated they needed. These courses could then articulate with further study. University courses could also include a work-based practical component to help bridge the gap between theory learnt at university and work-based knowledge and skills.

We acknowledge that while many university courses offer flexibility we argue that this is mostly in terms of delivery but not inclusive of content and student/teacher interaction. This is an area that requires greater consideration by universities if they are to offer work-relevant courses. Workers also reported a pervasiveness of ICT applications in their work environments. We believe that this calls for ICT to be integrated more widely in university subjects. This way workers can experience and develop an understanding of ICT embedded environments. This will require depth of planning for integration of ICT in terms of resource/cost implications for universities and students and is an area that may require further investigation.

It is interesting to note that while some of the train drivers in this study experienced their training on a shop-floor basis many years ago, this is no longer the case. We argue that while it is not necessary for train drivers to undertake university degrees, they do require skills and knowledge to cope with technology driven and new management practices. University “modular” courses may address this need. This may then inspire drivers to continue learning and move on to management positions.

Much learning seems to occur in the workplace and many of those in high-level positions have university training. We believe that it is important for those in blue and white-collar, middle level positions, such as some of the workers in this study, to undertake university courses that cater for different types of knowledge. This will enable them to integrate the necessary theory with the practical knowledge they are developing in the workplace

and in doing so potentially enhance their job performance. Further we believe that reforming higher education in terms of workplace learning will involve negotiation between individual, employer and higher education institutions to have academic credibility and benefit both practice and theory (Ayas & Zeniuk, 2001; Boud & Solomon, 2001). This is particularly true for hospital management personnel in this study who have moved from a private to corporate industry and are now integrating corporate procedures in their daily work.

In order for universities to recognise the nature of the changes in the workplace and adapt their practices, research to understand how the changes are affecting the requirements of new knowledge, skills and dispositions could be undertaken. There is also a need to determine whether formal and highly structured organisations like universities can accommodate a flexible and continuously changing job market. Gallacher and Reeve (2000) suggest that universities develop partnerships with organisations and workplaces. They may also need to recognise and accredit a wide range of learning experiences.

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