



19 - Individuals and Technology

The impact of technology upon workplaces now requires individuals to take responsibility for their own learning but this learning needs to take place within an environment that is supportive and respects the individual.

A change in technology use often leads to a change in the structure of the organisation and the way that an individual approaches his or her tasks.¹ In the preceding chapters it has been demonstrated that there are a range of new technologies that will involve additional learning by current technicians and other operatives.

During the course of this research, the contributors have commented not only on the actual new technology that is likely to be introduced but also on the difficulties of training existing workers. These managers and supervisors have indicated that many individuals in the existing workforce are hesitant to learn the new technology.

This presents a dilemma for management in that if these experienced workers do not learn the new technology, their ability to participate is limited and that the workers may face redundancy as a result. However if these experienced workers leave, the knowledge they possess will be lost and the organisation may not be able to be as productive.

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Managers and supervisors often mention that the younger and new employees do not seem to have the same difficulty in dealing with the issues of learning new technology. These workers are aware of the need to be able to acquire the necessary knowledge and skills to allow them to use the new technology.² However it has been found that “recruitment and selection processes were heavily focussed on acquiring new staff or trainees with appropriate generic skills and attributes” and that this focus is on individuals who can learn rather than individuals who already have specific technical skills.³

However, these new workers do not yet have an appreciation of the legacy processes and equipment that is necessary for a full understanding for expert operation in the workplace. The workplace that is facing changes in technology needs to have an understanding as to how the concepts and underpinning knowledge of these new technologies should be presented to existing workers so that these existing workers are able to continue to add value to the organisation.⁴

Introduction

Many observers of modern organisational change have noticed that globalisation and technological innovation have affected the production processes and the provision of services.⁵ These changes have an impact upon how work is performed, how workplaces are structured and the establishment of working conditions.⁶ All of these impacts require the organisation to operate differently and for employees to gain additional skills.⁷ These skills include greater decision making responsibilities; team work; greater underpinning knowledge; and, a broader understanding of the science of the technology being employed.

Some of these changes have led to the reduction of skills previously regarded as traditional or craft skills. The implementation of new technology reduces in some cases the need for long periods of training and allow managers to replace highly skilled staff with less skilled workers. These changes have also led to more flexible workplace practices and reduced security of employment for both unskilled and highly skilled workers.

As work becomes more knowledge-based, “workers are required to become knowledge workers and increasingly they require more abstract technical knowledge to carry out their tasks and a capacity for ongoing learning for the mastery of new disciplines.”⁸ In this sense it is the worker who needs to learn so that the organisation continues to exist. If the individual worker is unable to learn the new skills, the organisation must decide how to best satisfy its requirement. The organisation either trains existing workers or finds new employees who are either capable of being trained or are already trained.

The recruitment of new staff is always an expensive process when the cost of selection, training and the initial loss of productivity is considered. Where an organisation is growing or when recruitment is based upon succession planning, recruitment is a profitable or necessary exercise. However when recruitment is undertaken to build a skill set within an organisation, such as for the introduction of a new technology, the process of retraining existing workers can be cost effective but a more lengthy process. Employers prefer existing workers as they have already demonstrated a capacity to operate within the organisation’s culture.

Employers are forced to be impatient due to competitive pressure and sometimes are not prepared to allow the time for existing workers to develop the new skills.

Many of the managers interviewed for this project would prefer to retain their existing workers provided that they are able to acquire the new knowledge and skill. The managers' difficulty is in sufficiently motivating these existing workers to learn. The threat of redundancy is sometimes lessened as the transition process from old to new technologies is slow and still requires an expert understanding of the entire process.

Also there are difficulties in relation to the dismissal of competent workers due to industrial relations laws and employee representation. In many situations it seems the manager wishes to retain these workers regardless of their ability to learn the new technologies as they are highly experienced and loyal employees and are able to contribute to quality management processes.

The Australian National Training Authority has developed an attitudinal segmentation for the styles of learners within a structured training environment.⁹ Three of these styles may be of interest in this discussion and these are:

Might give it away - Young and pessimistic, they are learning now only because they feel they have to. Other people expect it. They haven't seen any benefits from learning yet.

Done with it - They valued learning for work but they've achieved what they can. They see no point in learning any more, unless they face a career reversal or some other major work change.

Forget it - Their heart is just not in it. The learning they've done hasn't got them very far, they don't love it and anyway, they are happy with their lot. What more do they need?

Interestingly these three groups represent 29 percent of the total market for structured learning as identified by the Australian National Training Authority. If this is generalised to the working community, this figure represents a considerable proportion of the working population. It also would mean that managers and organisations should be concerned as to how they should plan for training in new technology.

Recent Australian research does indicate that there are a number of trends developing that may not assist individuals in developing new skills. "These trends include:

- an emphasis of generic skills required by enterprises;
- decentralisation of the responsibility for training of employees to line managers; and,
- individuals taking responsibility for their own training, career planning and lifelong learning."¹⁰

The basic question posed at the start of this chapter still remains unanswered. How does a manager motivate an existing employee to learn new skills and acquire new knowledge? In the following sections of this chapter issues relating to learning

theory will be very briefly examined, issues relating to age will be discussed, the need for and definition of generic skills is overviewed as is the development of a culture of learning within an organisation.

Learning Theory

The following section outlines some of the major theories believed to be instrumental in ensuring that individuals are psychologically prepared to engage in learning. Interestingly in the process of preparing this chapter, there seemed to be little research available that provided a specific process for dealing with individuals who resisted learning new technology in the workplace.

An assumption expressed by managers and supervisors during the research for this project was that many existing employees were hesitant to learn the new technologies. What is proposed here is that there may be two types of employee. One who is unmotivated towards learning and another who has forgotten how to learn and is embarrassed to admit this. In either case, with our knowledge of learning theory and motivation, it should be possible to describe an environment in which the individual is able to overcome these negative attitudes.

At this point it is important that the reader is aware of the underlying principles that should be applied when examining the attitudes of existing employees. That is that the individual should not be placed in an uncomfortable situation in which his or her integrity, freedom of choice, or respect within the organisation is undermined. In this case, the use of threats by management to “make them learn” is viewed here as being counterproductive.

Expectancy Theory

This theory was made popular by Victor Vroom who applied an existing theory of behaviour to motivation within the workplace¹¹ and continues to be a popular motivational theory today.¹² The theory relates to the ability of an individual to make rational decisions in his or her own best interest based upon the expected outcome.

Very simply, the individual determines in advance if he or she is going to benefit and if the benefit is equal to or greater than the effort expended. The full explanation of this theory includes a mathematical formulae. For reasons of brevity, this will not be discussed. However there are four important components. These are:

Expectancy – this is the relationship perceived by the individual between the effort expended and the resulting assessment of the outcomes from the action.

Instrumentality – this is the perception of the causal relationship between the individual acting upon an event and the degree to which these actions will affect the outcome.

Valences – these are the feelings of the individual regarding the outcomes of his or her actions upon the beneficial nature of the outcome.

Force – this relates to the amount of effort that the individual exerts upon the environment.

From these four aspects it possible to see how an individual weighs up the possibilities of success or failure prior to taking action. For example, a person needs to believe that if he or she makes an effort, then there will be an outcome as a result (expectancy). In some cases a small effort can result in a large outcome. In other cases a large effort may not produce a outcome that is noticeable or valued. A practical example may be that if a person inserts a two-dollar coin into a machine for a cool drink and the machine does not issue a drink, the person will be hesitant to insert a second coin.

The individual may believe that only a small effort will result in large outcome (instrumentality). In this case there is the perception that the input and outcome are able be understood in a ratio. That is, if the individual spends an hour working on a problem, with the resulting solution saving three hours of labour a ratio may be established. If two hours are spent then six hours will be saved.

An individual may believe that the application of effort in an area will result in a beneficial or detrimental outcome (valence). An example of this may be that if a person believes that additional learning and up-skilling or multi-tasking will result in more work for the same pay, then the application of effort will be seen as a detriment. However if the individual sees the increase in skill and knowledge providing greater job security or employment mobility, then the individual may decide to apply himself or herself to the task.

The final aspect, force, is the degree to which the individual wants the outcome. In the mathematical formulae of the expectancy theory, this is the end result and the measure of motivation. That is, by determining the expectancy, instrumentality and the valences of the individual, it is possible to determine the force that the individual may apply to the task of learning a new technology.

The theory recommends that an empirical use be made of the components using high and low performers as a measure for the remainder of the workforce. This approach may be viewed as discriminatory and caution should be exercised. However as supervisors are able to recognise those individuals who are hesitant in learning the new technologies, this framework will allow for personal discussions to take place. During these discussions it is possible for the supervisor to discover concerns that the individual may have in learning new skills. These concerns may be:

- how will the individual benefit or be adversely affected by this training (valence)
- how hard will it be for the individual to learn these new things (instrumentality)
- how much effort will need to be made (expectancy)

Through the examination of an individual's perceptions and adjusting the workplace or learning situation to accommodate the concerns of the individual, it may be possible to create an environment in which the individual is able to overcome personally valid objections to learning new technologies.

Self-esteem

Nearly every workplace is to a greater or lesser degree a social environment and people quite often wish to feel valued in these situations. An individual's feelings of intrinsic value, satisfaction and pride of his or her self are important aspects for motivation within the workplace. As an individual successfully negotiates the workplace through problem solving and high productivity, greater levels of self-esteem and satisfaction are able to be achieved. These high levels of self confidence allow individuals to deal efficiently with unexpected events within their range of expertise.

The measurement of self-esteem can be viewed as a function of "success" divided by "aspirations". If an individual's success meets his or her aspirations, then high self-esteem can result. Low aspiration followed with low success may provide an individual with high self-esteem. High aspiration followed with low success may lower an individual's feels of worth and value even though the outcomes of their actions are highly valued by others.¹³

However when employees enter the workplace with the new skills required, the experienced existing worker may perceive his or her skill set to be inadequate and face a change in his or her self-esteem. Alternatively, the individual may rationalise the situation and apply a low value to possessing these new skills thus maintaining their self-esteem. This change in perceived social status from operating as an expert to novice (in terms of the new technology) can be threatening to the individual's self image.

Supervisors need to ensure that existing employees are provided with opportunities to learn in an environment that does not lessen their status within the organisation. This area does require research but may be accomplished with peer-only training rather than have new employees training with existing workers. Alternatively, high-status training that may include interstate or international travel may provide for the recognition that the individual may seek.

Self-efficacy

Individuals have a sense of their own internal capacities and if a person initiates an action he or she has a belief that the performance will be successful. This belief is termed "self-efficacy". It is more than just a feeling that a certain outcome will be achieved but it is "a strong conviction of competence" that is based upon an evaluation of internal resources.¹⁴

This theory is similar to expectancy theory but is able to be differentiated. Self-efficacy refers to the internal capacity of the individual rather than in expectancy theory of the degree of effort required, probability of success or the degree of benefit to the individual. Self-efficacy contributes to the amount of energy that is expended and the length of perseverance.

Self-efficacy is able to be enhanced through watching peers successfully accomplish a task, statements of encouragement from trusted peers, and successful initial attempts. Additionally, if a situation may result in embarrassment as a result of failure, the individual may attend to the task more closely to avoid embarrassment. Low self-efficacy is associated with anxiety, depression, feelings of

helplessness and feeling shy¹⁵ and is viewed as being a situational variable. That is, high self-efficacy in one place is not necessarily transferred to other situations.

This theory is important for supervisors particularly where a individual is overwhelmed with learning the new technology. An individual may feel that he or she is not able to learn new ideas or skills. This feeling of not have sufficient internal competence about being able to learn may cause the individual to avoid such situations. The concept of life long learning is important here to enable individuals to approach novel learning situations with confidence.

Locus of Control

This theory relates to the feelings of control that an individual has over the environment and his or her resulting behaviour. It is similar to the idea of instrumentality in expectancy theory but is viewed as a stable personal construct rather than a situationally-based behaviour. The theory uses a continuum that runs from high-internal through to high-external locus of control.

A person with an internal locus of control takes responsibility for his or her own actions and believes that he or she has control over his or her destiny. These people also believe that their accomplishments are due to their abilities and that failure or difficulties are due to external sources. Individuals with an external locus of control view the world as not being able to be controlled and that positive outcomes are not necessarily able to be attributed to themselves.¹⁶

In a situation where new technology is being introduced, an individual with an internal locus of control may view themselves as being in control of their own career development and learning. Individuals with an external locus of control may see themselves as being forced into learning new skills and may experience some anxiety as a result. Supervisors may find that existing workers with an internal locus of control are more willing to learn new skills.

Differences Between Young Workers and Existing Workers

The process of recruitment allows employers to bring in suitable workers who have a capacity and willingness to learn new things. This is likely to include younger employees who do not have a well developed conceptual understanding of the existing technology and is often a preferred strategy. As will be shown in Chapter 20 – Management and Technology, the suggestion is that new companies perhaps with new employees be formed who do not have any historical attachment to older technology and can embrace the new technology without reservation.

In a review of the Australian process manufacturing industry, it was reported that managers viewed the age of the workforce as a barrier to establishing job reorganisation. This was believed to be due to a lower level of formal education and training making these workers less able to acquire new skills.¹⁷

Many managers believe that older workers are not able to learn new things or are not able to learn them as quickly as younger employees. As a result, older workers are assumed to be incapable of learning perhaps for two common misconceptions. One is that the older worker does not have the mental capacity to learn (biological

atrophy) and another is that the older worker is too set in his or her ways to be able to change (epistemological inflexibility).

Age issues

In the mid twentieth century, a theory of intelligence was put forward by Raymond Cattell that stated (in very general terms) that there are two types of intelligence. One is fluid intelligence where novel solutions are able to be made and the other is crystallised intelligence where an individual solves problems based upon facts and knowledge of previously successful patterns of action.¹⁸ Younger people up to around 28 years rely more upon fluid intelligence and older people rely on crystallised intelligence to solve problems.

One valid biological explanation for this is that intelligence is associated with the frontal lobe of the brain¹⁹ and that the frontal lobe completes development at around 22 years of age. As younger people do not have the same length of time to develop concepts and schemas as do older people, it is assumed that younger people use fluid intelligence to solve problems. Older people rely upon their knowledge of the world to solve problems for which they have already developed solutions.

Older people are able to learn new tasks but levels of performance are strongly determined by practice.²⁰ But this statement is a generalisation and does not take account for individual differences. Our western society (as distinct to some Asian cultures) generally believes that individuals who are older are slower and less capable. In the workplace this is not necessarily true as success in the workplace is associated with the development of tacit knowledge and age is not a predictor of intelligence.²¹

Existing workers have developed a structured understanding of their workplace and this is termed “tacit” knowledge. This type of knowledge is characterised as being “disorganised, informal, and relatively inaccessible, [therefore] making it potentially ill-suited for direct instruction” or dissemination.²² The perception by managers that older workers are disorganised and therefore unable to learn new technologies ignores the data available on this issue of mental abilities. The view that older workers are not able to learn is a misconception.

Employability Skills

Managers and supervisors that have been interviewed for this project have remarked that if they had to choose on the basis of technical skill or personal attributes, they would prefer to recruit those individuals who were able to learn and work in a team. These skills are commonly known as employability skills but may also be referred to as technology-independent skills, transferable skills or generic skills. The need for these types of skills has long been recognised.

These generic skills were recognised by the Mayer Committee²³ who outlined the seven key competencies that Australian workers should be able to demonstrate. These are:

Collecting, analysing and organising information

Communicating ideas and information

- Planning and organising activities
- Working with others and in teams
- Using mathematical ideas and techniques
- Solving problems
- Using technology

Each of these competencies were to be assessed on a three tier scale to provide differing levels of performance. At the Level 1 a person was to be able to follow instructions, Level 2 required the selection of the appropriate methodology and resources, Level 3 involved the creation of new approaches to achieving a specific outcome or improved outcome.²⁴

Since that time, there have been a number of studies that attempt to define these generic skills. Perhaps the reason for the interest in these generic skills is that employers recognise that although new technology will always be developing and will require the organisation to adjust, change is the one constant that can be accounted for. The possession of these generic skills at the higher levels by an individual may allow him or her to adjust more rapidly to these changes.

An examination of generic skills will not be covered here as the literature is extensive. Each review of employer-preferred generic skill set sometimes leads to different sets. The value of generic skills is overwhelmingly endorsed by employers as being as important as the technical skills required for the work place²⁵ with an emphasis on “adaptability and the capacity to learn new skills while at work.”²⁶

Learning Organisations

A “learning organisation” has a culture that is able to demonstrate “a set of attitudes, values and practices within an organisation which support and encourage a continuing process of learning for the organisation and/or its members.”²⁷ This culture may be represented in written documentation or through the style of the leader or management of the organisation.

The culture of an organisation is the responsibility of management or a great leader and it is the culture that provides the implicit rules of behaviour for members of the organisation.²⁸ The introduction of new technology often requires the organisation to respond in a way that is discontinuous with previous activities. In this situation it is the organisation that needs to learn how to do things differently.

In an examination of “self defeating” organisations, it was found that two common beliefs existed. One was that meaningful change is impossible and the other was that improvements for the whole were held back by “the negative attitudes and behaviours of a few problematic individuals.”²⁹ As may be seen in these statements there are a number of difficulties facing an organisation that prevent changes being put into place and that not all of these are the result of individual behaviour.

Two main drivers of change in the workplace has been technological innovation and organisational change.³⁰ One other driver that might be included is in quality

management systems³¹ but this might be seen to be included under the title of organisation change and therefore contained within standard operating processes.

Other drivers identified by the Australian Industry Group include an increased ability to compete in international and national markets, the availability of trained staff to support innovation, increased organisational flexibility, and an increased sense of customer orientation.³²

The concept of a learning organisation began in the late 1980s with Peter Senge's book, *The Learning Organisation*.³³ Senge's focus was on five disciplines that include:

- Systems thinking
- Personal mastery
- Mental models
- Building a shared vision
- Team learning

The development of these disciplines needs to be done in conjunction with each other to provide for an integrated approach within the organisation. Stephen Covey provided another view of the difficulty that organisations face when developing a learning culture. In *Seven Chronic Problems*³⁴ that organisations face Covey highlights that an organisation may have:

1. A lack of a shared vision and values
2. No strategic pathway or one that is inadequate
3. Poor alignment within the structure of the organisation and value system
4. Management that does not follow the shared vision or value system
5. Management that lacks the necessary skills to manage the vision and value system
6. Low levels of trust within the organisation
7. A poor match between actions and the vision and value system

These seven problems need to be addressed before a learning organisation can develop and that changes in the technology, work organisation, and corporate management need to be properly aligned.³⁵

These observations are evident in some of the data available within Australia. For example, 86 percent of business with a business plan provided for on-the-job training compared with 58 percent of those organisations without a plan. Structured training was provided in 67 percent of those organisations with a plan compared to 34 percent of organisations without a plan.³⁶ This may represent Covey's Problem 2.

An examination of the management beliefs regarding training showed that senior managers did recognise the need for a skilled workforce for the long-term benefit of the organisation. However the managers and supervisors closer to the

production units and who had a day-to-day responsibility for production or service delivery were hesitant to have staff leave for training. This also presents difficulty for staff who rely on such training as part of their career development within the organisation.³⁷ This seems to support Covey's Problem 7.

Interestingly, there is some evidence that the process by which of management adopts new technology is influential in motivating individuals.³⁸ In an Australian review of new technology, the employees believed that they had adopted the technology better than the managers and this view was supported by the training managers. "The culture of the firm and the attitude of managers appeared to have a significant impact on the uptake and success of workplace changes and training effectiveness."³⁹

There are two types of learning within organisations. Adaptive learning refers to the responsive style of the organisation to the successful resolution of previous events. This learning and problem resolution must fit within the values and assumptions that the organisation holds about itself. The other type of learning is generative learning in which the organisation questions why it does what it does in the way that it is doing it. This type of learning "seeks to develop new ways of looking at the world based on an understanding of systems and relationships that link key issues and events."⁴⁰

Generative learning is viewed as the preferred style as it is able to be transformational and allows the organisation to respond to change more quickly. One cautionary note is that in order to develop new ways of looking at the world, it is necessary to question the assumptions that an organisation holds about itself. The questioning process in an intolerant organisational culture is unlikely to be received kindly by management as well as staff. It is just as likely for management to be stubborn to change as it is for staff to seek to rely on standardised work processes and working conditions.

There have been a few recommendations as to how an organisation can develop a learning culture. One suggestion⁴¹ is that an organisation should seek to develop:

- Continuous learning opportunities
- Systems that promote inquiry and dialogue
- Opportunities for collaboration and team learning
- Systems that capture and share learning
- A collective vision
- An awareness of the organisation and its relation to the surrounding environment
- Leaders who model and support training

Australian research⁴² recommends that organisation wishing to develop a learning culture should:

- Promote more communicative, collaborative environment in which individual learns from each other and collaborative work endeavours

- Introduce new systems, structures and processes which not only enhance production or service provision but also increase learning opportunity
- Increase opportunities for employees to contribute to decision-making if not at the policy-making level, at least at work process level about practices in the workplace
- Develop systems and structures that support learning; for example, visible documentation about work process, work roles, formal learning and development programs of performance data provision and performance review systems
- Increase learning opportunities and introduction of new ideas through establishment of partnerships and associations with a range of external stakeholders or other partners.

Perhaps one of the most important aspects for all learning situations – whether traditional settings such as schools or within the organisation – is the need for a psychologically secure and emotionally safe setting in which the learning is to occur and that employees are recognised for undertaking training.⁴³ This means that the organisation must encourage learning in a blame-free culture where learning is openly valued and encouraged. Additionally, there needs to be a supportive atmosphere where all parties are treated with respect.⁴⁴

Summary

Individuals do not learn in isolation to their environment. Within the workplace, individuals require the support of the organisation and its culture to be sufficiently motivated to learn. It is acknowledged that employers are seeking self-motivated learners to add value to the organisation but for the purposes of this chapter, it is those individuals who are existing and valued employees who are of interest.

Age does not prevent people from being able to learn however age does have an impact for some individuals on the speed at which new skills are able to be acquired. In order to encourage existing employees to learn new skills and technologies it is important that management creates an environment in which the individual feels free from embarrassment or loss of status. However, the desire to learn new skills does ultimately rest with the individual and it is the individual who must take responsibility for his or her professional development.

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