The Transfer of Literacy, Language, and Numeracy Skills from Learning Programmes into the Workplace

LITERATURE REVIEW
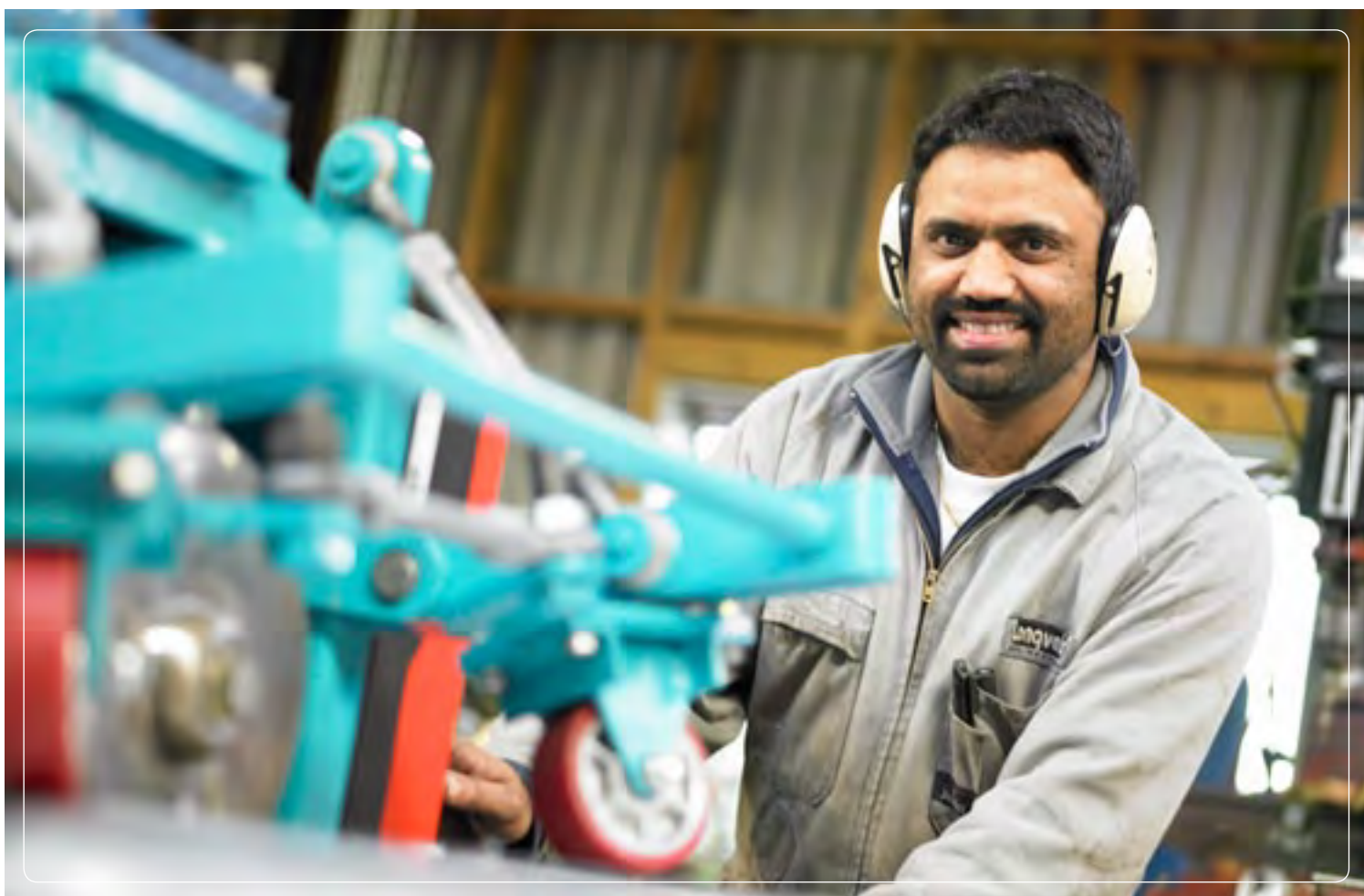
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1 INTRODUCTION: PURPOSE, DEFINITIONS, AND SCOPE OF LITERATURE REVIEW

This literature review is the first stage of a two-stage research project by the New Zealand Council for Educational Research (NZCER) for the Department of Labour. The project addresses the ways employees transfer, utilise, and develop literacy, language, and numeracy (LLN) skills in the workplace; the conditions that enable this to happen; and the short- to medium-term outcomes for employees and workplaces. The second stage will consist of case studies in workplaces where workplace LLN learning programmes are being offered.

Research questions

The review focuses on three main questions.

1   How has learning transfer been defined and researched in the literature?

2   What is known about the factors that support and hinder learning transfer in workplaces?

3   What is known about factors that support and hinder transfer in relation to the transfer of LLN knowledge and skills?

This chapter briefly outlines the overall purpose of the review, and begins to address question 1 by providing definitions for terms used in this literature, as well as definitions of 'transfer'.

Chapter 2 outlines our review methodology, explaining the search strategies we used and how we selected research for inclusion in the review.

Chapter 3 examines the concept of learning transfer in depth, and asks what evidence of transfer could look like (research question 1).

Chapter 4 outlines what is known about factors that support and constrain learning transfer in the workplace (research question 2).

Chapter 5 then looks closely at the handful of studies that directly examine the transfer of literacy learning in the workplace, and relates these to what is known about the factors that support the use of literacy skills at work (research question 3).

Chapter 6 draws the threads together to highlight the empirical implications for the next stage of the project.

Chapter 7 concludes with a discussion of the implications for future research.

Purpose and background

This literature review was commissioned by the Department of Labour to inform its research programme on adult LLN provision in the workplace. LLN skills are important in the workplace because low levels of literacy, language and numeracy (LLN) are a barrier to individuals gaining and retaining employment and progressing in the labour market.

As part of the Department's research programme, Benseman (2010) undertook a small case study at a single workplace over six months to investigate the transfer of learning between an LLN workplace programme and the workplace. His study indicated that learners were applying their LLN learning to their work in a variety of ways, and identified some factors that appeared to be important to the transfer process. Benseman recommended that a larger scale study be undertaken that explored the concept of learning transfer in greater depth and across a range of different work contexts, with a literature review as the first step.

At an early stage of the review it was discovered that there is very little published literature that specifically considers the transfer of *literacy and numeracy* learning. Only a handful of studies were identified. For this reason the scope of the review was broadened to include key articles in the literature on learning transfer, with a particular focus on work-based learning.

Scope of transfer as a concept

Many of the research studies we examined appear to take the term 'transfer' as a given. In some respects this is understandable given the common-sense understanding that skills and knowledge acquired in one setting are readily used (or 'transferred') to another situation in a meaningful way. But how we think about what this actually entails influences the conditions we see as relevant to any attempt to increase the chances transfer will happen. Here matters are not so self-evidently common sense. It is important to be clear about how we think about the act of learning and the scope of literacy, language, and numeracy. All these are contested terms, as we now briefly outline.

Framing learning as a concept

There is no single, general definition of learning (Hager and Hodkinson, 2009). One classic definition states that 'learning can be broadly defined as any process that in living organisms leads to permanent capacity changes and which is not solely due to biological maturation or aging' (Illeris, 2009, p 7). Again, this seems like common sense, but *how* learning happens is not made clear so definitions such as this cannot take us very far. Once we begin to consider the 'how' of learning, it quickly becomes apparent that different understandings of the nature of knowledge, learners, and learning lead to very different sorts of considerations and conclusions.

Many of the metaphors we use for learning are about *learning as acquisition*. Knowledge is 'out there' waiting to be deposited into the brain and withdrawn again when needed. In the most uncritical versions of this view, the act of learning happens in the same way, independent of the learner, and learning is

likely to be seen as an exercise in *training*. This perspective on learning underpins the belief that if you run a course on how to do something then participants should learn it, and be able to do it back on the job. If they don't, a likely conclusion is that they can't or won't learn (assuming the course is seen to be relevant and well run).

There are problems with thinking about learning in these simple terms (often described as behaviourist theories of learning). If this view were generally true, everyone who read a physics text book would take away the same knowledge from their reading. Everyone who was trained in the same skill would be able to do it in the same way. We know that is not the case. What you already know, your interest in the topic, and the learning strategies you know how to use, all influence what you can learn and the meaning you take from that learning. This way of thinking places the emphasis on the learner and the ways they build new understandings by connecting new learning to what they already know. Learning is not independent of the learner and is a process of *active construction* (cognitive theories of learning take this view). When learning fails to happen, problems are seen to reside with the construction processes learners use and teachers design. For example, more effective teachers will link learning to what their students already know.

Cognitive theories of learning are supported by what is known about how the brain works but are no longer seen to be sufficiently broad in scope to explain all the complexities of learning. Just as a brain can operate independent of a body, a learner is located in a context that will impact on what and how they learn. Here, learning is *situated*—it takes place in a *social system* (sociocultural theories of learning take this view). People learn from teachers and peers, but also by *participating* with and alongside others in day-to-day activities (Engeström, 2004). This perspective is particularly relevant to informal learning in the workplace.[1] If learning fails to happen, the conditions under which it is taking place will be implicated, not just the individual and the effort they are prepared to make.

If we consider the implications of combining both cognitive and sociocultural ways of thinking about learning, its full complexity for each individual begins to come into view, along with the implications for workplace learning and transfer:

> Motivation to engage in the process of learning is seen as determined by their previous experiences … these interact with organisational constraints in four main areas: in the extent to which the organisation facilitates access to knowledge and information; in the opportunity it provides to practice [sic] and develop new skills; in the provision of effective support for the learning process; and the extent to which it provides rewards. (Ashton, 2004, p 45, cited in Unwin et al, 2005, pp 7–8)

There is one more important idea to add to this necessarily brief overview of the scope of learning as a concept. *Learning changes people*. Once you really know something in a new way, there is usually no going back. 'Seeing the world with new eyes' is one metaphor that describes this type of change. Mezirow's (2000)

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[1] For a recent review of workplace learning, see Vaughan (2008).

theory of *transformative* learning spells out some implications of this simple but powerful idea by drawing attention to 'how we learn to negotiate and act on our own purposes, values, feelings and meanings rather than those we have uncritically assimilated from others—to gain greater control over our lives as socially responsible, clear thinking decision makers' (p 8).

This theory has important implications for transfer because people who develop greater 'agency' over their learning may be more likely to see how learning from other contexts (training programmes or from previous work or life experiences) can be used in the workplace, and have the self-confidence to use their new knowledge and skills.

If a transformative view of learning has implications for transfer, do behaviourist, cognitive, and sociocultural views of learning also impact on how we think about what transfer is and how it can happen? This is the question we consider next.

How do views of learning impact on views of transfer?

> There is no more important topic in the whole psychology of learning than transfer of learning … practically all educational and training programs are built on the foundational premise that human beings have the ability to transfer what they have learned from one situation to another. (Desse, 1958, *The Psychology of Learning*, cited in Haskell, 2001, pp 2–3)

Most definitions of transfer of learning have in common the notion that transfer involves 'carrying' learning from one context into another:

> Transfer of learning is our use of past learning when learning something new and the application of that learning to both similar and new situations. (Haskell, 2001, p xiii)

> Transfer of learning means that experience or performance on one task influences performance on some subsequent task. (Ellis, 1965, p 3)

It is interesting to consider that definitions such as these could be read in either a behaviourist or a cognitive framing of learning. They tell us nothing about how active the learner is in the meaning-making process, although this could simply be assumed. It does seem unlikely that their authors would have been drawing on sociocultural framing since there is no mention of the role played by contexts. This is not surprising. Until recently, sociocultural theorists tended to see the situated nature of learning as a barrier to transfer (Taylor et al, 2008). Illustrating their thinking, the well-known sociocultural theorist Jean Lave once wrote that the concept of transfer is 'an extraordinarily narrow and barren account of how knowledgeable persons make their way among multiply interrelated settings' (Lave, 1996, p 15, reported in Hager and Hodkinson, 2009, p 619). Hager and Hodkinson (2009) recommend abandoning the transfer metaphor altogether because transfer aligns with outdated and discredited views of learning as acquisition, whereas it is people who move from context to context, not what is learnt. Taylor et al (2009) make an important contribution to the debate by spelling out the implications of recent transfer research in the school sector for resolving this dilemma:

Engle (2006) provides a persuasive counter-argument to the commonly held notion that transfer and situativity are incommensurable. He argues that contexts can be socially framed to create intercontextuality. (Taylor et al, 2009, p 10)

The idea of intercontextuality draws attention to the teacher's role in framing both the context of the learning and the potential transfer context so that the learner is supported to see the links between them. It is not left up to the learner to see the potential connections, or not. Engle (2006) demonstrated how good teachers often do this intuitively when they notice and respond to connections that might otherwise go unnoticed, often talking of these links as if they were the student's idea, not their own. Frameable aspects of learning include 'time, location, participants, topics, roles and practices, and purposes' (Taylor et al, 2009, p 10). This idea could be a very useful lens to bring to the analysis of transfer of LLN learning.

Literacy, language, and numeracy as concepts

Just as there are multiple ways of thinking about the scope of learning and of transfer of learning, there are multiple ways to understand the LLN knowledge and skills at the heart of this project.

Literacy can be understood in a multiplicity of ways, as discussed in the recent NZCER literature review for the Department of Labour, *Engaging Young People/Young Adults in Literacy, Language and Numeracy* (Whatman et al, 2009). Our study *foregrounds transfer*, so we framed the literature review using relatively traditional understandings of literacy as the written and oral language people use in everyday life and work. We have not considered ideas such as multimodal literacy, although we have kept the situated nature of literacy in mind. For example, we are aware that literacy plays out differently for different people in different contexts, and these contexts may change over time. An employee may begin work able to handle the literacy demands of their work, yet find that demands change and they no longer meet expectations. An example of changing demands is where a workplace moves from using primarily oral communication patterns to requiring written documentation.

At one time, 'literacy' referred specifically to the written word, and 'language' tended to mean oral skills. However, recent definitions include speaking and listening, along with reading and writing, as part of literacy (Whatman et al, 2009). The *Literacy, Language and Numeracy Action Plan 2008–2012* (Tertiary Education Commission, 2008a) defines literacy in a way that includes language:

> … the written and oral language people use in their everyday life and work; it includes reading, writing, speaking and listening. (Tertiary Education Commission, 2008a, p 6)

There is no universally accepted definition of numeracy (Benseman et al, 2005; Tout and Schmitt, 2003). For example, Whatman et al (2009) report a study showing that industry representatives agreed about the importance of numeracy skills, but were less clear about what the term numeracy conveyed to them. They also tended to describe numeracy in terms of primary school–level number skills rather than in terms of knowing the mathematics skills that are appropriate

in particular situations and how to use them competently to solve problems. In this review, we use the Tertiary Education Commission's definition of numeracy:

> Numeracy is the bridge between mathematics and real life. A person's numeracy refers to their knowledge and understanding of mathematical concepts and their ability to use their mathematical knowledge to meet the varied demands of their personal, study and work lives. (Tertiary Education Commission, 2008b, p 59)

Having laid out the scope of the way we use key terms in this review, we turn now to the processes by which the review was conducted.

2   METHODOLOGY

Search strategies

The NZCER Information Services team, in collaboration with researchers, undertook the initial document search, using established databases. The search strategy encompassed the areas of focus described in chapter 1. Terms used were grouped into three broad sets.

- *LLN concept:* Literacy, numeracy, reading skills, writing skills, functional literacy.
- *Training/workplace learning concept:* Adult basic education, workplace literacy, adult basic skill, adult vocational education, industrial training, job training, trade and industrial education, job skills, career education, apprenticeships, contract training, in-service education, on the job training, off the job training, staff development, in-plant programmes, skill development.
- *Transfer of learning concept:* Generalisation, transfer of training, transfer of learning.

Literature dated from 2000 to 2009 was sourced using these terms. The transfer concept tended to narrow the search results, and in some cases we broadened the search by removing that concept and then looking for helpful but broader items. The following databases were searched:

- NZCER Library database
- New Zealand Educational Theses database
- ERIC
- Ebsco Educational Research Complete
- Te Puna National Bibliographic database
- Australian Education Index database Australian Education Index—AEI
- VOCED database http://www.voced.edu.au/ and a variety of databases via the Department of Labour Library
- Educational Evidence Portal http://www.eep.ac.uk/DNN2
- New Zealand Literacy Portal http://www.nzliteracyportal.org.nz
- National Adult Literacy Database (NALD) http://www.nald.ca/index.htm
- National Research and Development Centre for adult literacy and numeracy (NRDC) http://www.nrdc.org.uk/publications.asp
- Ako Aotearoa website http://akoaotearoa.ac.nz
- Literacy online website http://www.literacyonline.org

We searched the major repositories of adult literacy and language research studies in Australasia: the New Zealand Literacy Portal and the National Centre for Vocational Education Research (NCVER) website in Australia, in particular the Adult Literacy Research Program.

Two major overseas adult literacy research and development sites were also searched: the National Institute of Adult Continuing Education (NIACE, in the United Kingdom) and the National Center for the Study of Adult Learning and Literacy (NCSALL, in the United States). The search also used some material from a previous LLN search, which included material from the Workbase Library http://www.workbase.org.nz/Article.aspx?ID=485

The initial search identified a wide range of papers including professional wisdom (articles that are not research in the usual definition but that have some standing in the field in the light of individuals' experience or widely held consensus views), theoretical pieces (models proposed), evaluations of programmes, manuals, and other literature reviews (meta-analyses, critiques). From this information we were able to gain an understanding of the complexity of the issues involved in transfer, generate a useful discussion section defining the term *transfer of learning*, and design the framework around which to structure the review.

Selection of research

Once papers were located by the Information Services team, the researchers read them to assess relevance and quality, and looked for further relevant material within the reference sections of those papers. Our review of the literature revealed many papers espousing factors that aided or hindered the transfer of LLN learning from one context or another, or to the workplace, but there was often no obvious basis to these claims, no evidence presented of transfer, and little in the way of research findings to support the claims. We did not include these opinion pieces in our review.

When relevant literature was identified we did further searches using author names and where applicable contacted authors for forthcoming articles. Once papers were identified, we used Google scholar and Ebsco Education Research Complete to find further relevant research. To keep the focus on studies most likely to be relevant, we narrowed our parameters further to include papers from only New Zealand, Australia, Canada, the United Kingdom, Ireland, and the United States that were written or published in the last 12 years. Exceptions were made for papers from elsewhere that make major contributions to the field. Additional criteria for acceptance were that a paper was:

- directly relevant to the research questions under consideration
- empirical (offering evidence—quantitative, qualitative, or both for conclusions)
- theoretical (to provide insight, but not evidence, into the review questions)
- published in a peer-reviewed journal (although some non-published research was included if it met generally accepted standards for research—for example, a clear empirical or theoretical basis).

A bibliographic record was then established. Each publication was read and summarised in terms of the type of study, participants, research methods, and key findings.

Necessity to widen the literature base

Most of the studies that met our criteria for inclusion were about the transfer of learning in areas other than LLN. We found, as have other researchers (eg, Taylor, 2000b), that actual research on workplace LLN transfer is sparse. One researcher recently concluded that:

> No direct empirical research has examined the relationship between workplace literacy skills and employees' ability to improve performance through learning … [and] … limited research has examined the transfer of literacy skills from the classroom to the workplace. (Bates and Holton, 2004, p 154)

Despite the paucity of empirical research in the LLN field, the study of learning transfer as a process has a long history, with many insights that could contribute to the understanding of workplace LLN programmes. We asked ourselves whether the LLN field could learn from other research, and if so to what extent other research could shed light on the conditions that support transfer, and how transfer occurs for LLN learners in the workplace.

As part of our strategy to widen the sources of literature on which we drew we used two recently published literature reviews on the transfer of *training* (Blume et al, 2009; Burke and Hutchins, 2007). The first of these was a meta-analysis (an effect size was calculated for each study), and the second was an integrative review of relevant empirical research across the management, human resource development training, performance improvement, and psychological transfer literatures. These reviews were starting points for our understanding of the concept of transfer and the evidence that supported it. We later found further individual studies that examined the links between workplace training programmes and transfer.

One limitation of the research we found is that most of the empirical evidence on transfer of learning has been conducted with employees with higher educational attainments (for example, managers, senior public and private sector workers, doctors, and bank clerk trainees), which limits the extent to which the findings can be generalised to employees with low literacy skills.

Even the LLN literature that we did find had limitations. The teaching approaches for most LLN programmes outside New Zealand were different from the approaches used here, which limited their relevance. Many of the LLN approaches in other countries are generalist skills programmes while in New Zealand the recommended approach to workplace LLN teaching is for programmes to be directly related to the actual LLN demands for individuals in the workplace:

> The end goal [of the teaching of literacy and numeracy for adult learners] is to enable tutors to meet the learning needs of their adult learners so that those learners can engage effectively with the texts, tasks and practices they encounter in their training and learning. (Tertiary Education Commission, 2008a, p 3)

Summary of the most relevant studies

We located only seven studies that directly examined transfer of the learning gained in workplace LLN programmes to jobs. One additional study considered the impact of literacy levels on employees' responses to other workplace learning programmes (Bates and Holton, 2004). These studies are described in chapter 5. We also located a longitudinal study that examined the reading progress that learners made following workplace 'basic skills' provision (Wolf et al, 2009).

3 DESCRIBING TRANSFER AND DETERMINING WHAT TO LOOK FOR

Conducting a meta-analysis of 89 empirical studies (published between 1988 and 2008) led one research group to comment that the sheer volume of research about factors that impact on transfer of training comes 'at the cost of convergence and clarity regarding which factors relate most significantly with transfer and what can be leveraged to improve transfer' (Blume et al, 2009, p 7). In the interests of establishing some clarity, this chapter summarises the many descriptors used to characterise aspects of transfer. Following that, we discuss the types of evidence of transfer that researchers have sought. Only once these matters are clear, can we begin to discuss what has actually been reported.

Characteristics used to describe transfer

The literature on learning transfer 'spans multiple disciplines, fields, professions and contexts' (Ottoson and Hawe, 2009, p 11). Transfer looks different depending on who is investigating it. Table 3.1 summarises some of the aspects of transfer to which different researchers have paid attention and provides definitions of key terms used. The first row begins with transfer as an overarching concept. The many ways it is further qualified follow from that.

It will be obvious that the definitions outlined in Table 3.1 are not mutually exclusive. They may also play out differently for different people in the same situation. To illustrate this, consider the following scenario:

> At one time the Royal Air Force had a battery of aptitude tests for those hoping to enter the aircrew. One test presented the candidate with a board full of pegs placed in square holes. One half of the top of each peg was painted white, the other black. The candidate was told to reverse as many pegs as possible with the non-preferred hand in a given time. Some had what appeared to be a natural skill at the game, but there were also those who had had previous experiences as packers in industry (such as chocolate, biscuit or component packing) whose skill enable them to perform this task with outstanding dexterity. Some of the skills they had learned in one situation were now being applied in a similar situation. (Child, 2004, p 169)

The authors described this as a 'transfer of training', but which attributes on Table 3.1 might apply? For packers we could say this is near/lateral/specific transfer (they are already dextrous in this way). For others there might be considerable trial and error involved before they get it right but when they do, it will also be specific, and for both groups it will be low road (no abstraction is required). We need to be mindful of the different starting points of individuals when judging the extent to which they face a transfer challenge with their learning.

Table 3.1: Summary of characteristics of learning transfer

Characteristic	Explanation	Reference
Transfer	When a person uses learning from previous contexts in a similar situation	Child (2004)
	The degree to which trainees effectively apply the knowledge, skills, and attitudes gained in a training programme to the job	Baldwin and Ford (1988, p 63)
Generalisation and maintenance	Generalisation is the extent to which knowledge can be applied in new settings; maintenance is the extent to which changes persist over time	Blume et al (2009)
Near transfer	Occurs when tasks are the same or very close to the training tasks	Blume et al (2009)
Far transfer	Occurs when the content or context is different, or the new task is given much later than the training task(s)	Blume et al (2009)
Positive transfer	The extent to which the learning that results from a training experience transfers to the job and leads to meaningful change in work performance	Blume et al (2009)
Negative transfer	When previous learning interferes with new learning	Donovan et al (2000)
Low road transfer	When learners automatically apply a repeatedly practised technique in a new situation	Fogarty et al (1992)
High road transfer	Requires learners to mindfully abstract general principles that can be applied to the new situation	Fogarty et al (1992)
Lateral transfer	Using the same knowledge on the same tasks in a different context	Keiler (2007)
Sequential transfer	When new learning depends on previous learning the learner must be able to transfer learning from one level to another	Keiler (2007)
Vertical transfer	Being able to transfer knowledge to a more complex situation (such as using multiplication and subtraction skills in long division)	Keiler (2007)
Specific transfer	The literal transfer of what is learnt; in other words, those practices and skills exhibited in training are later exhibited, in much the same way, within the workplace environment	Merriam and Leahy (2005, pp 3–4)
Non-specific transfer	Involves more general skills or principles	Merriam and Leahy (2005, pp 3–4)

The example above suggests an interesting question about what does and does not constitute transfer. Arguably, the kind of transfer described is part and parcel of general learning for life—we all adapt our existing skills as and when we perceive a need to do so. Learning always involves building on what has already been learnt. If the new learning challenge is minimal, learners may not even be aware of the transfer. Baldwin and Ford (1988, p 63) suggest that *effective* transfer also requires that the learning is *maintained* over a period. Others emphasise the *generalisation* aspect of transfer, where skills learnt in training are actually used in a new context such as on the job (Olsen, 1998; Salas and Cannon-Bowers, 2001). Taking these arguments one step further, maintenance suggests *practice* and *mindfulness*—being aware of opportunities to keep using new skills. Generalisation also suggests a level of mindfulness— knowing when it is appropriate to use new knowledge or skills and being aware of instances when you do so.

Blume et al (2009) describe a 'generalization gradient' with transfer tasks that are the same or very close to the training tasks being more likely to be transferred (that is, 'near transfer'). When the content or context is different, or the new task is given much later than the training task(s), 'far transfer' is needed and is more difficult to achieve. The example they give is 'applying principles of electricity from training to troubleshooting complex mechanical problems under extreme time pressures' (Blume et al, 2009, p 41). The clear implication for research is that the nature of the transfer task and contexts needs to be carefully described.

Doyle (2004) provides the following examples of positive transfer:

> if someone learning a database package has background knowledge of databases or has used a different database package, they are likely to benefit in terms of time taken to learn the package; and the previous experience of learning algebra facilitates learning statistics. (Doyle, 2004, p 8)

Positive transfer is most likely to occur when the learner: recognises common features among concepts, principles, or skills; consciously links the information in memory; and sees the value of using what was learnt in one situation in another. There are overlaps with the mechanics example above, and with Keiler's (2007) idea of 'lateral transfer': using task knowledge in a different context (such as recognising that calculation of area can be used to decide how much carpet is needed to carpet a room).

Arguably there could be differences between the examples in the previous paragraph concerning the extent to which the connections are *consciously* made. This could pose a challenge for research where respondents self-report instances of transfer (Schunk, 1996). Negative transfer seems more likely to be something that evokes conscious awareness. Think of the effort involved in learning a new swimming stroke to replace a previously learnt approach, or 'unlearning' a misconception about place value when learning how to regroup sets of objects.

Examples in literacy, language, and numeracy contexts

We located no literature that analysed the different characteristics of transfer in relation to the specific challenges of literacy learning. In the absence of this literature then, we have attempted to infer from the general transfer literature what LLN transfer might look like. Learners bring their current LLN knowledge to their workplace learning programmes and use it as best they can to make sense of what they are learning. Transfer, therefore, does not just happen after a programme, it happens *within* the programme as well as *from* the workplace to the programme. The approaches employed in a programme may align with a learner's current understandings and foster positive transfer to new learning, or negative transfer may occur. For example, if reading has been taught previously using a very decontextualised phonics approach with an emphasis on accuracy of articulation rather than comprehension of the message, this approach could interfere with understanding strategies for comprehension that require inference and synthesis.[2]

Near transfer in a literacy context occurs when learners are able to take what has been learnt in their LLN programme and use it in their work. For example, an automotive engineer may learn how to write a limited bank of words that they need to use to list the parts they have used on a job. If they are able to do this accurately in their work, this would be an example of near transfer. Far transfer might occur if they are later able to use new supplier manuals for a car they had not previously worked on to locate parts and enter these names on their job sheet.

Another example, this time of lateral and vertical transfer, is that of a glazier whose job requires him to calculate and record the time he spends on each call-out job. During his LLN programme he learns how to do this; while he is out on the job, he notes and records the time taken for each job, an example of lateral transfer. Later on he figures out how he can transfer his time sheets onto a spread sheet, a possible example of vertical transfer.

Evidence of transfer

It will be obvious from the above discussion that this is not a straightforward question to answer. Taylor (2000a, 2000b) notes that while the notion of transfer appears to be straightforward and simple 'it is a highly complex concept to investigate, measure, and demonstrate' (Taylor, 2000a, p 1). Haskell (2001) claims that 'decades of research across different disciplines, using various methodologies, in varied learning contexts, including laboratory, classroom, and vocational education and training have found that transfer is rarely achieved' (p 29). Has transfer been so hard to find at least in part because of the likelihood that it goes unrecognised?

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[2] Thanks to Libby Limbrick, Faculty of Education, The University of Auckland for this example.

Amongst the many challenges for researchers seeking evidence of transfer are questions of how, when, and where learning transfers. How likely is it that researchers miss evidence because transfer happens when they are not looking or is in forms they do not see? Some researchers have commented on this dilemma. For example, well-known Canadian educator Carl Bereiter is quoted as having said the person being researched must 'transfer now, or forever be seen as a nontransferrer' (Bereiter, 1995, cited in Haskell, 2001, p 175). What Bereiter highlights here is the requirement for transfer to be demonstrated by the participant in a specific way determined by the experimenter. In a similar vein, Lobato (2006) has critiqued numerous transfer studies, and concludes that 'in classical transfer studies, researchers typically use improved performance as a measure of transfer, predetermining what will transfer rather than making the what an object of investigation' (p 437).

Blume et al (2009) note that transfer has typically been measured as either the use of a trained skill or the effectiveness in using the trained skill. The most influential 'measure' for evaluating training programmes was developed by (Kirkpatrick, 1967). Kirkpatrick's taxonomy has four levels, with level three assessing whether transfer has occurred. This model is shown in Table 3.2.

Table 3.2: Taxonomy of evidence-gathering questions

Level	Questions related to
One	How learners felt about the training (ie, their **reactions**)
Two	Whether they learnt anything (ie, **learning**)
Three	Was the learning transferred to the job? (ie, **behaviour**)
Four	Did training achieve its objectives? (ie, **results**)

Source: Kirkpatrick (1967).

While this is a popular model, it has not been used as its originator intended. A 2001 survey by the American Society of Training and Development, reported in Sutton and Stephenson (2005) found that although 60 percent of organisations that evaluate their training programmes use the Kirkpatrick model, 77 percent evaluate level one, 38 percent evaluate level two, 14 percent evaluate level three and just 7 percent measure results. While Kirkpatrick emphasises levels three and four of his model, participant satisfaction is more readily measured. There is also the belief (not supported by evidence) that trainee attitudes and reactions predict transfer (Burke and Hutchins, 2007).

Our review found that most evaluations of transfer were based on surveys of participants, and that the surveys tended to measure pre-training and post-training responses to statements based on factors that are believed to correlate with transfer. Holton et al (2000) developed and validated an instrument to measure factors affecting transfer of learning, and their factor analysis revealed 16 transfer system constructs. Second order factor analysis found climate, job utility, and reward to be important to transfer.

Most of the studies were conducted immediately after training, when transfer could not be demonstrated, sometimes after very short periods of training. For example, a study by Pidd (2004) surveyed employees after a 2-hour workplace drug and alcohol safety programme, and it is unsurprising that supervisor support was not found to be a significant factor. Wolf et al (2009) measured gains in reading a year after the completion of a 30-week literacy programme, and repeated the assessments 10 months later; although the authors did not use transfer terminology, the study could be described as being at level two (what was learnt).

Some difficulties are likely to be combinations of an actual transfer challenge and documenting appropriate evidence. We have already noted that much of the transfer of training research concerns professionals, with the research focused on 'high road' transfer of 'soft' skills such as management training. These skills are likely to be much more difficult to transfer given the large contextual differences between the training situation and the real-life world of dealing with people (an actual difficulty). They are also likely to be very difficult to document, given that the situations where they might be observed involve other people and could be sensitive, so creating ethical challenges (an evidence-gathering difficulty).

Some evidence of transfer could be indirect. Consider, for example, the proposition that transformative learning has a high likelihood of transfer because by definition it changes who the person is—the sense of self that they bring to their actions in the world, including further learning (Mezirow, 2000). Evidence of this sort of profound change could include developing greater autonomy as a worker (and learner) who can take control of actions rather than waiting to be told what to do next, and asking questions of self and others in order to make new learning connections (Taylor et al, 2009). Haskell (2001) describes this as having 'disposition to transfer' (p 117). Paradoxically, an LLN learner might be judged to display greater need for tutor support as they first begin to take proactive charge of their learning. Indirect and subtle changes would be all too easy to miss if specific and literal instances of use of new skills were the only type of evidence deemed to count.

Self-reporting could be seen as one way to address the challenge of reliance on the researcher's judgement that transfer had occurred. But, as already noted, the learner may be no better positioned than the researcher to recognise instances of transfer, unless they have a conscious awareness of them. The provision of some carefully worded examples of what transfer can 'look like' could be used as prompts, but care would obviously need to be taken not to 'lead' the manner in which responses were made.

4 FACTORS THAT SUPPORT LEARNING TRANSFER IN THE WORKPLACE

Despite the failure to demonstrate transfer there has been considerable research interest in how to address the 'transfer' problem—'how to lessen the gap between learning and sustained workplace performance' (Burke and Hutchins, 2007, p 263). The most frequently cited model of transfer in workplaces is that of Baldwin and Ford (1988). Baldwin and Ford analysed 63 empirical studies of transfer research from 1907 to 1987 to create the model shown in Figure 4.1.

Figure 4.1: Model of the transfer process
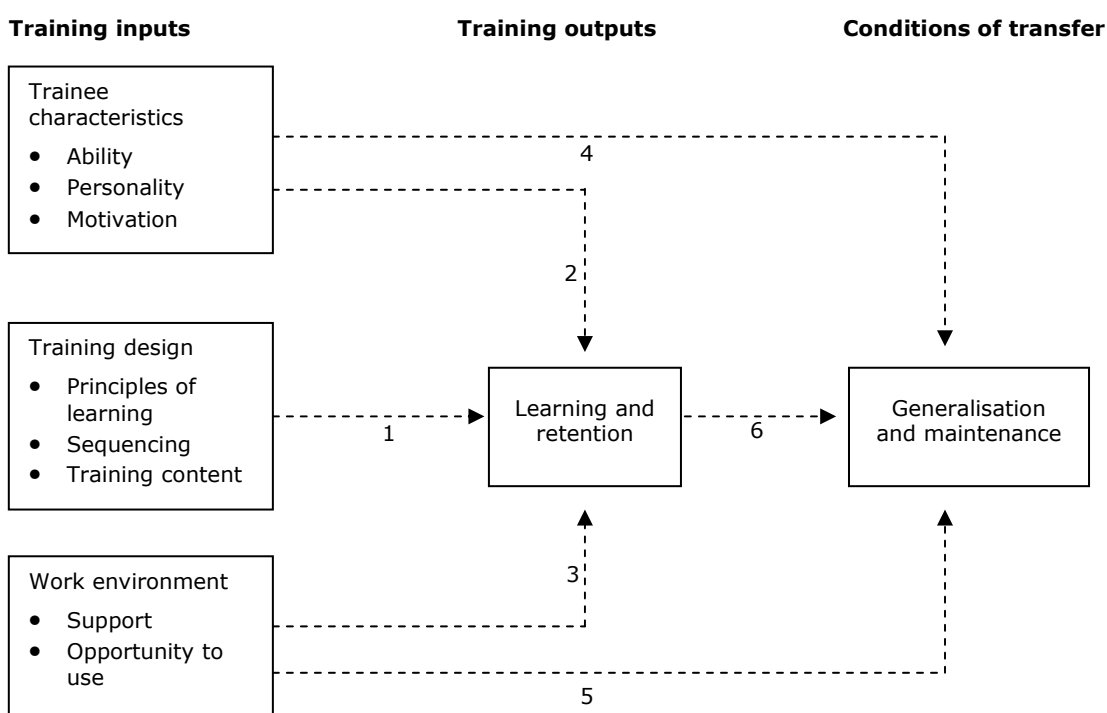
Source: Baldwin and Ford (1988, p 65).

Baldwin and Ford (1988) cautioned that there were major limitations to their model because of the short-term nature of the studies and the narrowness of the transfer tasks. Nevertheless, this model has been widely cited and is useful because it shows the interconnectedness of learning during the training programme (training inputs) and learning and retention after the programme (learning outputs). Training inputs and outputs also affect whether learning is able to be generalised to new situations and maintained over time (conditions of transfer).

As Figure 4.1 shows, six key linkages are critical in the transfer process. Good training or learning experiences (linkage 1) make it more likely that learners will understand and remember what they are learning. Trainee characteristics (linkages 2 and 4) also impact on learning and retention and on whether the learning is used in the workplace—trainees may experience a well-designed programme, but decide that it is not relevant to their work. Or trainees may not

receive support or opportunities in the workplace to attend regularly, which would impact on their learning (linkage 3), or to use the skills that are intended to be transferred (linkage 6). Workers also need support and opportunity to use their learning for it to be generalised to new situations and for the learning to be sustained over time (linkage 5).

The following hypothetical example illustrates how this model could apply in the LLN context.

Andrea has lived in New Zealand for 7 years. Her first language is not English, and she left school aged 14 years. She came to the country for a better life for herself and for her family. She is highly motivated to learn (linkage 2). She worked in a factory where she was required to document accidents, but because of her lack of confidence in writing she usually reported incidents to her manager who completed the paperwork for her. Her employer offered her the opportunity to go on a computer course and guaranteed her release from her duties for 2 hours each week for 6 months (linkage 3). LLN training was embedded in her course. As part of the programme Andrea worked on basic documentation tasks that were closely linked with the work she did on a day-to-day basis in her job. She also had personal goals, which included being able to communicate with overseas family on Facebook (linkage 1). Using Facebook provided opportunities for Andrea to practise and develop her writing skills (linkages 2 and 4). Her supervisors noticed her growing capabilities and encouraged her to develop her skills further by encouraging her to send and respond to work emails (linkages 3, 5, and 6).

The rest of this chapter organises the literature we found under the headings identified by Baldwin and Ford (1988). This exercise revealed that almost all of the transfer literature addresses learner and programme characteristics. It seems that less research attention has been paid to workplace factors. Similarly there is little discussion of how the factors identified by Baldwin and Ford actually influence transfer, so the relative strength or significance of each factor is not well understood at this point. Note, too, that the majority of the studies come from outside the LLN context, given the paucity of relevant research directly in this field. Also note that participants in these analyses were from a wide range of training programmes, including some at professional and managerial levels. With these caveats, we now outline what we found.

Trainee characteristics

Congruent with commonly held views of learning as primarily an individual act (as discussed in chapter 1, behaviourist and cognitive learning theories take this stance) much of the literature about conditions under which adults transfer their learning concerns the characteristics of the learners themselves. Table 4.1 outlines six broad types of characteristics, linking each to the research we found and the specific insights each piece contributed.

Table 4.1: Learner characteristics that could impact on transfer

Characteristic	How this influences transfer	Reference
Cognitive ability	Ability to learn in the first place is necessary before transfer can be achieved	Baldwin and Ford (1988) Burke and Hutchins (2007) Blume et al (2009)
Existing knowledge and skill levels	The greater the level of existing knowledge and skills the easier it is to make links to new learning and hence the steeper the learning trajectory	Ford and Weissbein (1997)
	A new skill may be needed as a prerequisite to the skill being taught (sequential transfer in Table 3.1)	Benseman (2010)
Views of self as a learner	Self-efficacy (belief in one's ability to accomplish goals)	Chiabaru and Marinova (2005)
	Nature of motivation to learn (mastery or performance oriented—that latter being simply to achieve the task at hand)	Taylor (2000b) Burke and Hutchins (2007) Ford and Weissbein (1997)
	Fear of failure may lead to avoidance of challenge	Chiabaru and Marinova (2005)
Other dispositional attributes	Openness to new experiences	Burke and Hutchins (2007)
	Conscientiousness	Blume et al (2009)
	Commitment to the organisation	Burke and Hutchins (2007)
	Personal ethical frameworks (if being trained to do something with which you do not agree)	Kakavelakis et al (2008)
Perceived usefulness of learning	What the training is for, career goals and so on	Burke and Hutchins (2007)
Impact of life contexts	Other time commitments may impede learning	Taylor (2000b)
	Other life events may impede learning	Merriam and Leahy (2005)

An interesting tension arises in this literature, depending on the underpinning assumptions about what learning is—the learning theories that are often tacitly taken as givens. For example, Cornford (1996) asserts that whether people learn or not is largely under their control in that:

> … it is the self-regulatory and control factors within the individual that determine whether a skill is learned or not, or to what degree social influence is accepted and whether there will be internalization or rejection of standards. Acquisition and maintenance of skills are dependent upon cognitive factors largely controlled by the individual. (Cornford, 1996, p 5)

Here the focus is all on the individual learner. Broadening the frame to include sociocultural insights into what learning entails, we would comment that accepting characteristics such as learner motivation and self-efficacy as 'givens' is not helpful. These can be influenced within the workplace, before, during, and after training.

Illustrating this interplay between the personal and the social, a New Zealand evaluation of 18 literacy and numeracy courses over a 3-year period Benseman et al (2010) found that *selection* for LLN courses is important because courses must meet the learning needs of participants. Benseman et al found it to be discouraging for employees to be enrolled by their company in an LLN course when they did not have literacy needs, and considered that learners with very high needs may require a much longer training programme than the typical LLN workplace programme. Their study highlights the importance of accurate assessment of literacy skills at the start of LLN programmes so that those for whom the programme is unlikely to be of benefit can be offered other options.

Similarly, 'cognitive ability' is an elusive and contested concept (Nuthall, 2001). Nuthall asserts that successful learners have had more experiences than unsuccessful learners that have led them to be able to engage more purposefully in learning activities. They ask more questions and persist with problems longer than those with less successful learning histories. As a consequence they learn more and become more able, and possibly would have higher 'cognitive ability' if this were measured. If Nuthall is correct, then differences in cognitive ability are more likely to be the *consequence* of differences in learning experiences than the other way round. The implication that we can take from Nuthall's work is that people should not be excluded from training on the assumption that they are unlikely to make much progress—if they receive training experiences that support them as learners they may become more successful learners.

Training design

According to Haskell (2001), 'Practitioners and researchers are realizing that the failure to find transfer is often because of conditions that prevail during the original learning' (p 173). In this section we look at the different components of training programmes in relation to evidence of their impact on transfer. Baldwin and Ford (1988) advocated the inclusion of some classical principles of behavioural learning into the design and delivery of training programmes. The key principles were:

- identical elements (aligning content and approaches between training and transfer settings)
- general principles (helping learners to understand the general principles that underpin what is being learnt)
- stimulus variety (using many examples of what is being learnt)
- practice (including feedback on progress and over-learning).

This review expands on these principles to reflect subsequent research and New Zealand approaches to LLN teaching. Table 4.2 outlines key characteristics of training and reasons given for their impact.

Table 4.2: Training characteristics that could impact on transfer

Characteristic	How this influences transfer	Reference
Appropriate to learner needs	Courses are structured around what the learner needs and wants to know	Taylor (2000b)
	Prior understandings impact on what is learnt	Kakavelakis et al (2008)
Seen to be relevant	Both a company needs analysis and an individual needs analysis should be undertaken so learners know what they are learning is important	Benseman (2010)
	Near transfer is more likely to be successful than far transfer (eg, using a manual that workers actually use on the job)	James (2009) Benseman (2010)
	Learning makes explicit links to work contexts, using task simulations, workplace examples and so on	Taylor (2000b)
	Programme planners liaise with supervisors to ensure learning is reinforced in the workplace	Merriam and Leahy (2005)
Sufficient time to learn and practise	Training too slight so no solid basis for transfer established. Practice is essential for transfer	Haskell (2001)
	At least 100 hours of learning and practice needed to acquire significant cognitive skill/proficiency levels	Anderson (1982), cited in Haskell (2001)
Able to be generalised	Knowledge learnt at rote level rarely transfers	Donovan et al (2000) James (2009) Gillespie (2002b) Taylor et al (2009)
	Learners prompted to observe similarities and differences in tasks/contexts	
	Attention should be drawn to underlying principles, patterns, and relationships, and instruction is linked to larger ideas that can be translated across contexts	
	The tutor needs to frame contexts of learning and of work so that links between them are made clear (intercontextuality)	
Variety	Use of a range of examples increases likelihood that general patterns and so on will be seen	Gillespie (2002a)
Opportunities to reflect	Learners need to be supported to make new links and practise doing so	Haskell (2001)
	Encourage learners to identify and discuss any barriers to the use of strategies in new contexts	Taylor (2000b)

In New Zealand it is a requirement for government-funded workplace literacy programmes to be tailored to the literacy demands of their work based on a workplace needs analysis (Tertiary Education Commission, 2009). Burke and Hutchins' (2007) review indicates that there is minimal empirical support for this requirement. Nevertheless there is compelling evidence that effective teaching requires finding out what learners can do, identifying next steps, and teaching these. For example, Alton-Lee (2003) presents evidence that quality teaching involves being knowledgeable about typical learning progressions, skilled in diagnosing learners' prior ideas that are the focus of teaching, and tailoring teaching to the needs of students. Tertiary Education Commission resources articulate the same principles: knowing the demands of learning progressions, knowing the learner, and knowing what to do (Tertiary Education Commission, 2008c).

If learners are not helped to see how learning is connected to the 'real world' they are likely to switch off, or acquire superficial or incorrect learning that is no use to them in solving problems outside their original learning programmes. Teaching approaches that focus on 'transmission' of information rather than fostering adaptation, learning, and situational meaning are unlikely to foster the understandings and dispositions towards learning that would make transfer possible. These explanations, however, are not reflected in the literature on transfer specifically, but reflect current educational understandings of quality teaching that are relevant to learners of all ages (Alton-Lee, 2003).

Specific literacy, language, and numeracy transfer challenges

Management training tends to emphasise the acquisition of open skills—using these skills back on the job requires the exercise of judgement. This directs attention to the question of whether LLN skills are open or closed. We have found no research on this, but note that the LLN skills a learner needs to acquire depend on both the learner and the context. At very early learning levels they may be quite closed (such as learning the alphabet or multiplication tables) but they become more open as the learner develops greater expertise, and is in a situation where greater expertise is expected and acknowledged. Open skills are those that are more tied to learning principles and there is usually a number of ways to use them.

The nature of the LLN skills being learnt also means that transfer can occur at different rates. Some skill areas (for example, spelling and English pronunciation) take longer to learn and are slower to become evident in practice. On the other hand, once some skills (for example, learning to calculate totals by multiplying rows) are learnt, they can be readily applied, and can have a more immediate impact on people's jobs. Benseman (2010) commented that 'some LLN skills (e.g. some aspects of maths) are probably more discrete and can be taught more readily than others (e.g. poor English pronunciation that is strongly established) and can therefore be more readily transferred'.

Since most workplace literacy programmes run for 40 hours or less, sufficient time to practise is likely to be an issue, and proficiency beyond very basic levels is unlikely without additional practice on the part of learners. Haskell (2001) argues that not all practice is appropriate, however—he identifies 'reflective practice' as essential. This requires that a person practises an activity so often that it becomes automatic, and fluid, freeing up the mind for higher order processing skills. In literacy this is sometimes termed *reading mileage*—when readers have read a lot, they become more fluent readers, able to extract meaning from text rapidly and able to notice when they are losing meaning and to apply strategies to get back on track. Achieving sufficient reading mileage allows a learner to be part of a self-improving system where much future learning is in the control of the reader.

Work environment

The workplace learning literature provides a helpful lens for looking at transfer. There is deeper recognition now that what is learnt in training does not automatically 'transfer' into the workplace. Certain characteristics of workplace organisation and culture have powerful impacts on how learning is supported and recognised and whether it is able to be transferred and developed (Subedi, 2006).

Work environment variables have been investigated less often than individual characteristics and training design. Nevertheless, there has been an expansion of literature on how the workplace nurtures or constrains learning since Baldwin and Ford's (1988) review. Their review identified the 'transfer climate' as an important contributor to positive learning outcomes, with four broad sets of characteristics as shown in Table 4.3. The table expands on Baldwin and Ford's work to show how details about what such a climate might entail have been added to over the intervening years. Note that both positive and negative influences are described.

While all the *suggestions* summarised in Table 4.3 have been made, the *evidence* for workplace influences relating to transfer has not become much clearer. Blume et al (2009) found significant variability of findings in their meta-analysis of 59 studies. Furthermore, their meta-analysis appears to have little relevance to LLN learners. The participants were mostly students, managers, and supervisors, with most training programmes lasting 2 hours. Blume et al (2009) noted the limitations such learning situations place on the learner's ability to transfer:

> … the bulk of evidence on interventions is still not very action oriented. That is, the vast majority of studies have stopped at the point of identifying, describing, or measuring factors that may influence transfer without investigating how those factors might be effectively managed or changed. (Blume et al, 2009, p 41)

Clearly, there are ongoing research challenges in this area of workplace transfer studies.

Table 4.3: Work environment characteristics that could impact on transfer

Characteristic	How this influences transfer	Reference
Opportunities to practise	Situational cues remind learners to use their training (eg, availability of equipment) and the workplace provides opportunities to use the skills	Rouiller and Goldstein (1993)
	Tutor understands workplace, helps workers see opportunities, and liaises closely with supervisors	Benseman (2010)
Support from peers	Co-workers who create a climate that dissuades learners from showing and applying their new skills are a barrier	Taylor (2000b)
	Learning has greatest impact on practice when co-workers form a 'community of practice'	Felstead et al (2008, p 7)
Organisational support	Poor communication between employer and employees, low morale, and lack of encouragement are barriers to transfer	Taylor (2000b)
	Company putting time pressures on the employees (because of cost of training compared with being on the job) is a barrier	Taylor (2000b)
	Encouraging participants to assess organisational climate and potential barriers allows these to be dealt with	Merriam and Leahy (2005)
Consequences	Feedback (positive and negative) from others in the workplace influences whether learners use their training	Rouiller and Goldstein (1993)
	Supervisor supports learners to practise and consolidate, and gives appropriate feedback	Benseman (2010)
	Ideally, feedback is in one-to-one discussions	Taylor (2000b)

Several of the studies noted that learners perceived that transfer was more likely to occur when they had the opportunity to use the new skill soon after the course. A small-scale case study by Falk and Millar (2002) provides an example of a participant's views of the timing of practice following training:

> Godfrey has participated in a large number of training courses aimed at developing personal and verbal presentation skills. He feels these have helped increase his confidence and in this way they 'helped enormously'. But he believes that the courses that helped most were the ones where he had the opportunity to put his new skills into action immediately. 'I think that, if you don't use these things, they are largely lost unless you make the effort to go back and revisit all your notebooks and course notes'. (Falk and Millar, 2002, p 51)

Holland (2009) conducted a New Zealand study of four apprentices from the glass industry, investigating the learning connections they made between their formal training course and their work on the job. The study design allowed the researcher to gain rich insights into the learning of apprentices and the workplace practices that supported or limited their learning. The researcher spent time over several months talking with apprentices about their learning and observing them at work in both course and on-job contexts. This level of contact allowed the researcher to demonstrate that transfer between the two settings was indeed occurring; apprentices were able to reflect on how they were able to use knowledge from the course in their work. In some cases they were able to adapt the skills from the course so that they aligned better with the practices in their workplace. Transfer was occurring as they recontextualised their learning to fit their work contexts. While this study was not framed in terms of literacy transfer, it does provide a concrete illustration of the concept of intercontextuality (see chapter 1) as discussed by Taylor et al (2009) in LLN contexts.

Holland's (2009) study also provides a rich contextual picture of other characteristics of the workplace, as outlined in Table 4.3. For example, the study highlighted the impact of workplace practices on apprentices' opportunity for ongoing learning. Some workplaces provided more 'expansive' environments that offered opportunities for apprentices to extend their skills (allowing far transfer to occur); to solve problems independently (with assistance available if needed); and to work alongside more experienced workers. One workplace, with an apprentice who had English as a second language, restricted his learning by providing him with a narrow range of routine tasks to perform. He worked mostly on his own, thus he missed out on learning from and communicating with others. Holland (2009) concluded that 'the apprentice who would most benefit from practice in literacy and numeracy is least able to do so in his current job, which involves a minimal amount of measuring, job sheet reading, and completion' (p 18).

Training outputs

The 'outputs' from training in Baldwin and Ford's (1988) model are successful learning and retention. These are achieved by the combined influences of training inputs and work environment influences. However, Baldwin and Ford provide no information on what successful learning and retention looks like, although we assume they mean that people will be able to use and remember what they learnt in training.

5   LITERACY LEARNING TRANSFER STUDIES

This section describes in more detail the studies we found that were explicitly about the transfer of LLN knowledge and skills. Not all of the studies were of workplace literacy programmes, but they have something to bring to the discussion about how people can be supported to use literacy and numeracy skills in their work. The summary at the start of each study introduces the reader to the purpose of the study (why) the specific context (where), the kinds of participants (who), the characteristics of their training (what), and the methodology and evidence that were used for judging transfer (how). At the end of each summary, we draw out the implications the author has made in relation to literacy and numeracy transfer and add any implications that we see.

The LLN studies reviewed here tend to talk about transfer in a straightforward way, without providing a definition of the concept. Transfer of learning occurs from a learning context to the workplace when the learner/worker effectively applies what they have learnt to their job.

Taylor (2000)

Table 5.1: Summary of key features of Taylor (2000b)

Feature	Description
Why (purpose of study)	Explore the common types of transfer strategies
Where (context)	Eleven workplace literacy education programmes in Canada
	Programmes from manufacturing, utilities, service, mining, health, and natural resources sectors
Who (participants)	Instructors, trainees, and supervisors in selected programmes (participants recruited by programme leaders)
What (nature of learning/training)	Off-the-job learning
How (methodology)	Examined common transfer strategies used by instructors, trainees, and supervisors before, during, or after training
	Ninety interviews—questions elicited information about different transfer strategies before, during, and after the programmes
	Field visits, observation notes, and diaries kept
	Simple frequency counts of self-reported transfer strategies
	Classification system for the transfer strategies and barriers developed using constant comparative technique

Table 5.2 reports the results of the simple ranking of frequency mentions. It shows that the instructors reported the most frequent use of transfer strategies, particularly before and during the programme but their roles appeared to end at the conclusion of the programme. Trainees said they thought about transfer opportunities at all stages. Supervisors had the lowest involvement in transfer, although interviews showed that they reported workplace barriers rather than lack of support for learning transfer.

Table 5.2: Ranking of transfer strategies and when these were used

| Role | Periods when transfer strategies were reported | | |
	Before programme	During programme	After programme
Instructor	2	1	9
Trainee	5	3	4
Supervisor	7	6	8

Note: 1= most frequent; 9 = least frequent.

Table 5.3 summarises the results of this extensive study. Note how well the key transfer strategies and barriers reported by participants accord with the discussion in the previous sections of the review.

The detailed findings shown in Table 5.3 are partly attributable to the careful and thorough research design. We also think it is important to note that Taylor explicitly draws on sociocultural learning theories to frame his work. It is an approach that appears to pay dividends in terms of the rich and practical detail elucidated.

Table 5.3: Transfer strategies and barriers to transfer

Role	Transfer strategies before the programme	Transfer strategies during the programme	Transfer strategies after the programme	Perceived barriers to transfer
Instructor	Learners/ supervisor help plan Site visit to workplace Employees observed at work Transfer objectives developed Transfer information included in introductory session Supervisor involved in administration Buddy system prepared	Content linked to real work tasks Feedback focus on application of new information Ongoing communication with supervisors Classroom discussions connect learning to the job, and discuss barriers to transfer Five-step problem-solving process around new skills Critical reflection exercises occur regularly Creative teaching aids developed to use back on job	Follow-up assistance provided Learners are linked with peers Programme evaluation results used to inform future programmes Connection with supervisors and learners continues Refresher sessions provided Learner completion is recognised	Poor organisational climate (low morale, poor communication, lack of encouragement, organisational restructuring with unclear outcomes for employees) Not enough practice during class time Off-site programmes, out of working hours
Trainee	Pre-training orientation Communication with supervisors Input into programme planning Participation in pre-programme activities Engagement with organisational goals	Notes kept of ideas and applications Development of transfer of learning plan (with supervisor) Intention and plan to review new information Links with buddy	Transfer of learning plan used Mentoring relationship developed Continuing contact with training buddies	Motivation, attitude, confidence of the trainee Other time commitments Negative attitudes of co-workers Lack of opportunity to use skills in the workplace
Supervisor	Participates in needs assessment Involved in programme orientation Informed about coaching skills Helps provide a positive training environment Understands goals of programme and makes these clear to trainee Informs trainees of organisational investment in them	Interruptions prevented Spreads out work assignments to others Participation in transfer of action planning Recognition of trainee participation Opportunities to use new skills provided	Opportunities to practise new skills provided Trainees debriefed Acts as role model Positive reinforcement provided Small wins celebrated Mentoring	Time pressures (related to employee time off job for training) Peer pressures (criticism of programme participation, discouragement for using skills) Limited opportunity to practise Learner attitude

Falk and Millar (2002)

Table 5.4: Summary of key features of Falk and Millar (2002)

Why (purpose of study)	Investigate literacy as embedded in social practices (ie, as used in life, not just at work). Are these skills transferable?
Where (context)	Australia
Who (participants)	'Non-standard' workers: a small business owner, a worker with several jobs over several sites, a telecommuter, a non-standard worker, and a person who was long-term unemployed
What (nature of learning/training)	No specific training programme
How (methodology)	Five case studies, data collected from semi-structured interviews and observations

Falk and Millar's (2002) data led them to conclude that transfer is a misleading term and obscures what is really going on. Their participants commented in detail on:

> the ways they had to learn and re-learn new literate and numerate practices and identities throughout their lives … People are good at communicating from having learned to do so in a variety of contexts, not because they apply some other skills they have from somewhere else. Therefore, to learn to be good at it, you have to have the contexts for learning. (Falk and Millar, 2002, p 53)

What happens, the researchers claim, is that particular skills, knowledge and identity resources are 'brought into use' at each unique event (Falk and Millar, 2002, p 56). Thus, successful use of LLN skills is driven by specific needs in specific contexts that promote self-efficacy. Falk and Millar also conclude that practice is essential. They criticise the expectation that LLN courses on their own are sufficient for transfer 'in these short weeks learners are supposed to make up the "deficits" in literacy and numeracy of a lifetime while they are supposed to become "job ready"' (p 53).

For Falk and Millar the priority should be effective learning:

> The steps in an effective learning process that works in different contexts are: first, to establish the need for learning; second, to negotiate a common purpose for the projected activities; third, to design the necessary quality and quantity of opportunities for the learning events—formal and informal; fourth, to embed knowledge, skills and identity resource development strictly in achieving that purpose; fifth, to embed the learning as far as possible in meaningful contexts; sixth and finally, to evaluate (as the five people in the five case studies do in this report) and celebrate the achievement of the purpose and the redefinition of further learning goals. (Falk and Millar, 2002, p 56)

Fagan (2003)

Table 5.5: Summary of key features of Fagan (2003)

Why (purpose of study)	Investigation of continuum of learning transfer, throughout a literacy programme from trainer to tutors, from tutors to parents, parents to children
Where (context)	Canadian family literacy programme
Who (participants)	Eighty parents and 80 children, 11 facilitators, the programme developer, and one other person who trained the facilitators
What (nature of learning/training)	Knowledge of 40 different activities to help parents take advantage of literacy opportunities to foster their children's literacy development in five broad contexts: talk/oral language; play; books and book sharing; environmental print; and scribbling, drawing, and writing
	Parents taught various activities covering a range of social and cognitive skills including reading nursery rhymes, and supporting their child's writing
How (methodology)	Effectiveness of transfer measured using a 'reverse learning effects' process: the top 25 percent (children who learnt the most) and the 25 percent who had learnt the least formed the two groups studied
	Literacy attitude inventory, open-ended questionnaires, self-ratings and interviews used (details provided)

The findings are helpful because they provide specific examples of what the transfer of learning looked like in this context. For example, 'An overall effect of the training received by all parents was that they spent more time with their children on reading and writing activities, read to them more, and helped them with their reading when asked' (Fagan, 2003, p 18). Fagan found that the continuum of learning transfer cannot be neatly controlled, and discusses a number of factors that 'magnified or lessened the transfer effects. These factors included parent and child characteristics, prior knowledge, extended family support, time, site location of training, and number of participants in a training session' (p 42).

Although the contexts are not workplaces there are many findings that have implications for programme design that are relevant to literacy learning.

- In addition to the transfer of knowledge or skills, learners may experience, or construct, other things such as a change in attitude towards literacy learning or a development of self-efficacy.

- There was a chain of influence across the different contexts, where 'effective behaviour on the part of one group of participants was preceded by effective behaviour of another significant stakeholder' (Fagan, 2003, p 36). The author commented that 'a chain is only as strong as its weakest link' (p 43).

- The facilitator matters. If a facilitator did not provide an overall effective learning experience, then the parents who attended this facilitator's sessions were never rated as providing a most effective experience for their children. Making parents feel welcomed and valued, giving people time to share experiences and problems were all important factors.

- Modelling of activities and practising gave parents hands-on practice.

- There was time between the sessions for parents to practise at home.

- Individual factors matter. While the previous learning experience was a good predictor of performance, it was not a guarantee of transfer as in a few instances tutors or parents did not provide a good learning experience despite having received one themselves.

- Building in links between the different contexts assisted transfer. The programme showed parents how to make and use literacy activities from low-cost or free materials that all family could access (such as sales flyers, magazines, and wrappers) to take home. They also received a new recreational reading book to take home to read to their children. These became connectors between the programme and the home.

- Parents who had poor LLN skills attended fewer sessions or dropped out. Some felt intimidated by other parents or judged for their limited knowledge. This highlights the need for careful selection or specific attention to the needs of these learners.

Bates and Holton (2004)

Table 5.6: Summary of key features of Bates and Holton (2004)

Why (purpose of study)	Investigates whether or how differences in workplace literacy skills may affect individual perceptions of organisational learning transfer systems. 'Do employees with different mastery levels of job-related workplace literacy skills differ in their perceptions of learning transfer system factors?' (p 155).
Where (context)	State Department of Transportation in the southern United States
Who (participants)	A total of 1,079 employees: mobile equipment operators, highway foremen, engineering technicians and highway maintenance specialists, and superintendents
What (nature of learning/training)	Participants had attended several job-related training programmes, that appeared to range from technical training to supervisory training
How (methodology)	Used workplace literacy assessment instrument (two 40-minute multi-choice tests: reading for information and applied mathematics, performance rated as 'Pass math', 'Pass read', 'Pass both'
	Also a Learning Transfer Systems Inventory
	Both instruments developed by the authors and validated in previous research

We debated whether this study should be in the literacy transfer section as it is not specifically about the transfer of literacy skills. We chose to include it partly as a salutary lesson of a trap to watch out for. Bates and Holton (2004) considered that employees without the literacy needed for their jobs might avoid participating in training to conceal this 'weakness' (authors' terminology) or, if they did participate, that their literacy skills deficits could be a barrier to their ability to profit from training. We are aware that effective programmes start from learners' current literacy levels and build on them, so this type of issue should not arise, but we will need to watch for deficit and pessimistic approaches to LLN learning in the second phase of our research.

The researchers found that individuals with fail scores in reading and maths started with high motivation but perceived factors that impacted on transfer differently from those without fail scores. They reported having more feedback and coaching than those who 'passed', but they also perceived greater levels of active resistance in the workplace to transfer of learning (less openness, lack of peer support, and more supervisor sanctions). The authors' explanation for these findings is that 'individuals with low literacy levels have high expectations about the value of training —they recognize training can help them do their jobs better—but are less able to transfer new skills and knowledge effectively (perhaps because low literacy skills create learning and transfer difficulties)' (p 167). Those who passed both reading and maths reported greater workplace support for learning transfer and more opportunities to use their new knowledge. Paradoxically, they reported less self-confidence in their ability to use their new knowledge, and less motivation to do so. The authors did not comment on the possible implications for this finding.

What did we learn from this study? The study provides further evidence that LLN levels, learning from general workplace training programmes, and transfer are related, although the study raises more questions than it answers. We think the study highlights that learners' levels of literacy knowledge and understanding need to be considered in any workplace training programme. Hit or miss programmes that fail to align with learners' needs and goals are unlikely to meet the needs of learners or the workplace.

James (2009)

Table 5.7: Summary of key features of James (2009)

Why (purpose of study)	Investigation of transfer from a university English as a second language (ESL) course to a writing task typical of the kind required in other academic courses. Could transfer be promoted by asking students to look for similarities between the writing task and the ESL writing course?
Where (context)	Arizona State University
Who (participants)	Thirty students
What (nature of learning/training)	ESL course in a tertiary academic context
How (methodology)	The only experimental study reviewed. Students' writing examined for evidence of transfer after completion of a 40-minute assigned writing task, for which half the group were given transfer prompts (eg, identify at least four similarities between this writing task and work in the academic writing course)
	Students asked what they had attempted to transfer in a 10–15 minute interview immediately after task completion
	Supporting data: one-page background questionnaire; copy of one graded assignment from writing course

James (2009) was curious about the extent to which students were able to achieve transfer, because 'writing courses require students to demonstrate knowledge of a source text much less frequently than other academic courses do' (p 70). In other words, the similarity between the training situation and other academic writing was not strong. This would mean that if students were able to write effectively in their other academic course they would be demonstrating far transfer. James also structured his study to take into account the notion that transfer can occur in two ways; 'low-road transfer which is unconscious and automatic, and which occurs when two situations are sufficiently similar; and high-road transfer, which is conscious and effortful, and which therefore does not require similarity between situations' (p 72). Because the transfer of learning from an English as a second language (ESL) writing course might be either low road or high road, James designed the study to account for high road transfer (by asking the students what they tried to transfer) and low road transfer (by examining the students' writing for evidence of learning transfer).

Statistical data were presented on the success or otherwise of transfer. Some students (43 percent) reported using reading, writing, and thinking-related learning outcomes such as identifying the main ideas, using transition words to organise their writing, and using brainstorming as a preparation strategy. James concludes intentional, or high-road, transfer was uncommon. In a detailed discussion of the findings, he analyses the essay data to conclude that low road transfer did occur, but in a 'constrained' manner. That is, 15 of the course's learning outcomes were used on the essay (showing skills were learnt) and then these 15 outcomes were 'used by at least some students on the writing task' (James, 2009, p 76). There was almost no difference in learning transfer between the group of students who were asked to look for similarities and the

other group. Simply asking students to identify similarities between the writing task at hand and work they had been doing in their ESL writing task was not enough to promote learning transfer.

It would be imprudent to give this study's findings too much weight because of the differences in population and context, the small sample size, and the short length of time between learning and transfer. James (2009) is careful not to draw overly strong conclusions from his data. He does not draw the conclusion that the chasm between the two learning contexts (writing course and other academic courses) could be lessened if the ESL course tutors made greater efforts to align their course writing tasks with what is expected in their other courses. That is, any notion of intercontextuality is missing from this study.

Taylor, Ayala, and Pinsent-Johnson (2009)

Table 5.8: Summary of key features of Taylor et al (2009)

Why (purpose of study)	To investigate learning transfer for low-skilled adults in employment preparation programmes and the teaching strategies that support such transfer
Where (context)	Canada
Who (participants)	Fifteen adult learners, four instructors, three workplace supervisors, and a focus group of four instructors
	Learners were immigrants from the Middle East, East Asia, and Africa as well as Canadian born, and did not have a high school level education or employment-related credentials
What (nature of learning/training)	Classroom instruction with work placements or visits to potential transfer contexts (daycare, customer service, entry-level healthcare and training programmes for adults with mild developmental disabilities or mental handicaps)
How (methodology)	Case studies at four sites, using 'purposeful maximal sampling' to gain the greatest range of perspectives
	Semi-structured interviews with all participants, an instructor focus group, field notes from observations

The curricula used by tutors in this study were constructed to meet the specific requirements of the workplaces. The skills emphasised were communication and language skills, consumer maths skills, computer skills, workplace safety, and worker rights. Some of the curriculum was based on the Canadian Government's Essential Skills Profile, which includes reading text, writing, document use, numeracy, oral communication, working with others, continuous learning, thinking skills, and computer use. No information is given about the length of the programme.

Themes that emerged from the data analysis included the transfer of knowledge through life role and the importance of essential skills as signposts for transfer. For some trainees transfer happened through different roles they had in life (for example, as parents or community workers). For example, one learner applied her new knowledge about children's behaviour and playground activities at home, in her role as a parent, and before applying it in the daycare work placement:

> I practice what I learn from my teacher even with my children, then I practice in the placement … before the programme I didn't know how I read to the children; before I read to my children but not the way the teacher told us and how to make the children interested in the story … and now they understand. (Taylor et al, 2009, p 7)

The usefulness of essential skills as a guidepost for transfer was also demonstrated. Computer literacy, oral communication, and continuous learning were the skill areas that learners talked most about transferring. One participant reported that she now used the computer to locate additional information to what she received in the programme; the authors considered this to be evidence that she was using more complex skills. Participants found the computer skills useful for emailing and looking at job advertisements. (Most participants had home computers or easy access to one in their immediate neighbourhood.) With developments such as these, the training programme was judged by the researchers to have become a springboard for ongoing learning, and the instructor–trainee role shifted with the trainee seeing the instructor more as a resource for their continuing learning.

In relation to their question about teaching strategies used to transfer learning, the researchers concluded:

- the instructor is central to learning transfer because they are 'the chief architect for connecting the design and delivery of classroom learning to the workplace or work-practice setting' (Taylor et al, 2009, p 8)

- instructors can also help trainees develop self-assessment strategies, which they can then use in the work placement settings to help gauge their own progress

- learners and instructors figured out the way that trainees learnt best and presented information in a variety of ways to enhance potential for transfer—this could be described as making meaningful connections between trainee, instructor, content, and methods

- regular debriefing sessions helped trainees to reflect on their learning in the workplace and to connect the different learning contexts, and to encourage critical thinking about their roles as workers

- workplace supervisors also supported the transfer of learning by providing an orientation session about the work placement settings, bringing the language of the workplace to the classroom

- transfer was assisted in one work placement by both the trainee and supervisor using a tool developed in the training classroom in the workplace to assess progress

- open communication during placements between trainees, instructors, and workplace supervisors was important for identifying potential problems and taking action.

The authors concluded that the programmes encouraged transformative learning with trainees now developing their identities to conceive of themselves as participants in the Canadian mainstream workforce and culture. The importance of instructors and the role they can play in transformative learning was highlighted. The authors consider that the study helped to unite ideas of

sociocultural learning and transfer by its links between the two sites for learning. They also believe it challenged the view that adults with limited literacy have to build foundational skills before working on more complex skills. The adults were demonstrating their use of more open skills in their use of the computer, oral communication, and continuous learning strategies. The authors recommend embedding basic skills into broader and more complex learning activities that support connections between the workplace and programmes, particularly given evidence that decontextualised skills fail to transfer.

Benseman (2010)

Table 5.9: Summary of key features of Benseman (2010)

Why (purpose of study)	To explore the extent to which learners transfer the language, literacy, and numeracy (LLN) skills taught back to their jobs, and factors that impede or facilitate the transfer of new LLN skills to these jobs
Where (context)	The only New Zealand research we found focused directly on transfer
	Case study of an LLN workplace programme, based in a manufacturing company
Who (participants)	Eight participants from one firm
What (nature of learning/training)	LLN workplace training programme—1 hour a week for 48 weeks
How (methodology)	Phoned monthly (open-ended interviews) with a final face-to-face interview

Benseman (2010) identified several limitations to the study, including its small sample size and no observations of learners in the workplace or interviews with their supervisors. However, the study's strength is that it clearly identified each employee's learning goals and their views of how well they considered they had achieved them, and sought verification from the tutor. The learners all reported that they were using at least some of their new skills:

- doing their paperwork themselves (for example, using Microsoft Outlook, completing production reports)
- using email and jobSAFE software
- improving their completion of paperwork
- improving accuracy and efficiency (numeracy)
- improving oral English (giving instructions, speaking at meetings).

Benseman (2010) reported that transfer was uneven, given 'the learner's previous skills and the nature of the skills being learned'. One participant was unable to use his computer skills from the course because his supervisor denied him access to the computer. Benseman's focus on actual LLN practices in the workplace highlights the need for studies that unpack how learners recontextualise LLN learning in their workplaces and how they are able to extend these practices when they need to.

6 DRAWING THE THREADS TOGETHER

Our extensive search of the learning, transfer, and LLN literature revealed that with the exception of the Canadian studies (Taylor, 2000b. Taylor et al (2009) and a small New Zealand study (Benseman, 2010) there has been no research that directly explores the transfer of LLN skills from training programmes to the workplace. We have relied on the wider transfer literature that included meta-analyses of transfer of training (in particular, Baldwin and Ford, 1988) to frame our review and from which to draw conclusions about what LLN transfer in workplaces could look like. We have highlighted the importance of describing learning transfer in workplaces using a sociocultural frame where intercontextuality is a useful lens for describing specific actions that can facilitate transfer.

When we examine the transfer literature alongside the LLN studies we described in chapter 5, we can tentatively draw conclusions about what we might expect to see when LLN transfer occurs. The case studies we undertake will attempt to assess the extent to which elements essential for transfer are in place, as well as to help us and the workplaces we are in to determine whether additional critical factors are at play. Of course, another conclusion we could draw, as others have, is that identifying LLN learning transfer in workplaces is challenging. We hope to bring new insight to existing evidence.

In chapter 1 we discussed how LLN transfer is the process by which learners are able to make use of past LLN learning and use that learning in similar and new tasks .Transfer does not just happen after a programme, it happens within and during the programme. The review has highlighted that, key elements need to be in place for successful transfer of LLN skills to occur from LLN teaching and learning settings to the workplace (and perhaps beyond). These have been synthesised from the research discussed in chapters 3 to 5 into the following five points.

Training or learning experiences are well designed and implemented so that learners are more likely to understand and remember what they are learning. The effectiveness of the trainer is an essential part of this. Learning occurs within the LLN programme, in the interaction between the LLN programme and the workplace, and after the programme to help trainees connect what they are learning to their 'real world'. Training characteristics that could impact positively on transfer are that the programme includes pre-training orientation sessions; is appropriate to learner needs and seen to be relevant; provides sufficient time for learning and practice; focuses on learning that is able to be generalised; offers variety and a range of examples; and provides opportunities to reflect, make connections, and discuss potential barriers to the use of strategies in new contexts. Programmes are negotiated with supervisors who support trainers and the workers' involvement in them.

Trainee characteristics are such that learning transfer is more likely to occur. These characteristics can include learners possessing sufficient background knowledge and skills; self-efficacy and motivation to learn; dispositional attributes such as openness to learning and commitment to the organisation; and a perception that the learning is useful, as well as not having other life circumstances that overwhelm their ability to benefit from learning.

Trainees receive support or opportunities in the workplace to attend their programme regularly—from their peers, from the trainer and the supervisor, and from the employer. Open communication between the parties identifies problems and barriers that could hinder learning.

Trainees receive support or opportunities in the workplace to use the skills that are intended to be transferred from their peers—from the trainer and the supervisor and from the employer. Appropriate feedback is essential. Trainees are encouraged to solve problems independently and to extend their new skills, and to work alongside experienced workers. Buddy systems may be put in place. Learning and transfer are celebrated.

Workers are given support and opportunity to use their learning so it is generalised to new situations and the learning is sustained over time. Follow-up assistance is provided by the trainer. The organisation uses programme evaluations to inform new programmes including refresher sessions.

7   IMPLICATIONS FOR FUTURE RESEARCH

This review demonstrates how important it is for researchers to make their theoretical assumptions visible; to clearly define what they mean by literacy, by transfer, and, indeed, by learning. Throughout the review we have highlighted the potentially productive dimensions that a sociocultural view of learning brings to research of workplace transfer, but it is also clear that cognitive factors should not be neglected. Indeed, Taylor et al (2009), who insightfully use sociocultural perspectives throughout their work, also call for research from a constructivist perspective, to provide qualitative data on 'the lived experience of the transfer of learning' (p 4), in particular on the cognitive aspects of the transfer phenomenon.

The LLN studies in chapter 4 are congruent with the analysis of transfer training contexts other than LLN, as outlined in the earlier sections of the review. Transfer is part of a network of effective learning processes. Learning to do something in a training programme is an important learning step that shows that an initial understanding has been achieved. Deeper learning is demonstrated when the learner is able to see how what had been learnt is relevant in a new context, and is able to refigure their learning, or reshape the task itself when faced with a new challenge. Many factors are relevant in this process, relating to learners, learning programmes, and workplace conditions, and these have been comprehensively documented in this review.

Given this complexity, another clear implication for future research is how important it is to pay careful attention to the nature of evidence of transfer—how it will be measured or otherwise documented. It appears that qualitative studies will prove most useful for answering the how and why questions about how people learn and use literacy practices in their work, and how other people and aspects of the work context itself support or constrain this transfer. These studies will have very little to say about learners' cognitive development but judicious use of the new Tertiary Education Commission literacy and numeracy assessment tool [3]could do so. Thus, no one method will allow all the implicated perspectives to be gained. A mixed-methods design, with provision made for integrating qualitative and quantitative data for specific individuals, should yield fruitful insights.

There are indications in the LLN studies that one of the most important outcomes of literacy learning programmes is to set up participants to be able to build on their learning in the future. Learning here is less of a one-off inoculation of skills and knowledge but rather an investment in self as a springboard for future learning. Learning programmes that assist employees to become future focused, and workplaces that provide incentives and opportunities for further learning are also essential if learning is to grow and expand.

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[3] To find out more about the literacy and numeracy assessment tool go to www.literacyandnumeracyforadults.com

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