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## Introduction

Improving adults' literacy and numeracy skills is a key action within the New Zealand Skills Strategy. Over the next three years, the Tertiary Education Commission (TEC) will be helping to build the tertiary sector's capability to provide education and training opportunities that embed literacy and numeracy into vocational and other curriculum.

Research confirms that improving workforce literacy, language and numeracy skills works best if the learning is in a context that is relevant to the learner, eg. existing workplace training. The Literacy, Language and Numeracy Action Plan proposes a significant increase in the amount of explicit literacy and numeracy teaching and assessment that is embedded into vocational training.

To achieve the scale of high quality learning opportunities required we need to ensure a whole system approach which makes literacy and numeracy a sustainable part of core business.

Providers will be encouraged to make changes in organisational infrastructure, leadership, teaching, resources, curriculum, training arrangements, course design and assessment that will be necessary to deliver the outcomes sought from this Plan.

(Tertiary Education Commission, 2008a, pp. 6, 10, 13.)

This document comprises a theoretical framework. that will be refined and elaborated as the capability and capacity of the sector to provide effective literacy and numeracy teaching and learning increase. This developmental approach recognises that the current situation will change from 2008 and, consequently, the theoretical framework will evolve to reflect this. The intention throughout is to keep the focus clearly on improving literacy and numeracy outcomes for a significant number of adults in New Zealand.

This document outlines the theoretical understandings that can be used as a basis for making principled decisions about strengthening literacy and numeracy in vocational training. Ongoing development of the theoretical framework will take account of emerging evidence about means of strengthening literacy and numeracy , that include for example, embedded provision.

The theoretical framework provides the basis for a series guidelines for strengthening literacy and numeracy in vocational training. The guidelines will assist different types of TEOs to systematically apply understandings about effective practice to their organisation. As well as responding to changes in the theoretical framework, the guidelines will be elaborated on through the experiences of the sector as it strengthens literacy and numeracy by embedding these skills in vocational courses.

## Policy background

Literacy and numeracy skills provide the essential base for building a competitive, highly skilled and productive workforce. Employers, unions and education providers have increasingly recognised that improving literacy and numeracy skills presents a critical challenge for the current workforce.

The decision to build the sector's capability to strengthen literacy and numeracy into the provision of education and training in other areas rests on understandings about **how adults learn** considered alongside an analysis of the **settings** that provide optimum learning opportunities.

Embedding literacy and numeracy in provision such as vocational training is considered to be the most effective and efficient way to provide direct, purposeful instruction in contexts (settings) that allow both the initial opportunity to acquire new literacy and numeracy knowledge and skills, and plenty of scope for practising them.

The key policy documents that describe the Government's strategy to increase the literacy, language and numeracy skills of the workforce in New Zealand are:

1. *Tertiary Education Strategy 2007–12 incorporating the Statement of Tertiary Education Priorities 2008–10*, which identifies increased opportunities for literacy, language and numeracy in the workforce as a national priority for tertiary education.
2. *New Zealand Skills Strategy Action Plan 2008*, which has as the third of its five goals “influence the supply of skills through a more responsive education and training system”. This is supported by two actions:
  - Increase literacy, language and numeracy learning opportunities, and the quality and relevance of those learning opportunities.
  - Raise workforce and employer awareness of the benefits of literacy, language and numeracy skills.
3. *Literacy, Language and Numeracy Action Plan 2008–2012*, which outlines the government's responses to the challenges set in the *New Zealand Skills Strategy Action Plan 2008*. Over the next four years, an additional \$168 million is available for the development and implementation of a range of initiatives that aim to progressively increase the number of adults who have the literacy and numeracy skills required to meet the changing demands of modern society and workplaces.

The *Literacy, Language and Numeracy Action Plan 2008–2012* gives priority to raising the literacy and numeracy skills of those already in the workforce and those near work. This is likely to lead to the quickest return in terms of improvements in competitiveness, and is one way to ease continuing skill shortages. A workforce focus will mean that the literacy and numeracy skills taught are pertinent to both employers and individuals.

Research confirms that improving workforce literacy, language and numeracy skills works best if the learning is in a context that is relevant to the learner, for example, existing workplace training. The *Literacy, Language and Numeracy Action Plan 2008–2012* proposes a significant increase in the amount of explicit literacy and numeracy teaching that is embedded into vocational training.

## The Theoretical Framework

The theoretical framework comprises 6 sets of research based findings or understandings:

- how adults develop their literacy and numeracy expertise
- the features of effective embedded literacy and numeracy provision
- the workplace as a context for strengthening literacy and numeracy
- effective learning materials and how to develop them
- the role of assessment in strengthening literacy and numeracy
- managing and sustaining change to professional practice.

The key findings or understandings from research are presented in three ways, giving progressively more detailed information. These can be used in different ways depending on the purpose and audience.

1. Overview: The overview gives a single-sentence summary of the key understandings for each of the six areas. This overview is a useful introduction to the research findings.
2. Summary: Each key understanding is expanded with three or four bullet points that provide a brief summary of the research findings.
3. Detailed: A detailed description is given for each key understanding. This includes a discussion of the research findings; the implications for practice and the reference list.

# Overview of key understandings

## 1. How adults develop their literacy and numeracy expertise

- 1.1. Adults engage in learning for their own larger purposes. These purposes are associated with their roles in society as workers, family members and community members.
- 1.2. Adult learners develop expertise by building on their existing knowledge, skills and experiences.
- 1.3. Adult learners develop their literacy and numeracy most effectively in contexts that have meaning to them. As learners develop their expertise, their increasing awareness of their knowledge and skills allows them to apply them in a wide range of contexts.
- 1.4. Adults who have experienced repeated failure are likely to feel anxious and reluctant to engage in further learning.

## 2. The features of effective embedded literacy and numeracy provision

- 2.1. Successful approaches to embedding literacy and numeracy clearly link the literacy, numeracy and vocational components of the course.
- 2.2. Where tutors work as a team, learners are more likely to stay in training and complete literacy and/or numeracy qualifications in addition to vocational qualifications.
- 2.3. Effective assessment in programmes where literacy and numeracy are embedded makes use of Learning Progressions to provide direction for teaching programmes and to monitor progress toward learning goals.
- 2.4. Embedded literacy and numeracy provision is facilitated by appropriate organisational policies, management structures, resourcing and working conditions.

## 3. The workplace as a context for strengthening literacy and numeracy

- 4.1 *Changes in the nature of work and in the global market mean that companies need to function with greater flexibility and with higher skill levels if they are to compete effectively.*
- 4.2 To participate successfully in new work processes, adults need to participate in workplace learning that is underpinned by literacy and numeracy skills.
- 4.3 There are benefits for employers and employees when employees increase their literacy and numeracy skills
- 4.4 Employers need support to make and act upon the connections between workplace learning, literacy and numeracy, job performance and productivity

**4. Effective learning materials and how to develop them to strengthen literacy and numeracy**

4.1. *tbc*

4.2. *tbc*

4.3. *tbc*

4.4. *tbc*

**5. The role of assessment in strengthening literacy and numeracy**

5.1. *tbc*

5.2. *tbc*

5.3. *tbc*

5.4. *tbc*

**6. Managing and sustaining change to achieve effective long-term embedding of literacy and numeracy**

6.1. Organisations are more likely to develop and maintain effective approaches to embedding literacy and numeracy when the value of literacy and numeracy is understood and literacy and numeracy are viewed as integral parts of vocational training.

6.2. Teaching materials are important tools that can substantially influence the content and enactment of instruction.

6.3. Professional development programmes can be effective in improving tutor practice and learner performance.

6.4. Assessment data provides valuable information that can be used systematically to improve programmes.

# Summary of each key understanding

## 1. How adults develop their literacy and numeracy expertise

- 1.1 Adults engage in learning for their own larger purposes. These purposes are associated with their roles in society as workers, family members and community members.
- Learning programmes that are transparent allow adults to see how their learning links to their own particular purposes.
  - Adults need to be involved in setting learning goals and monitoring their progress towards these.
  - Motivation is a key factor in engagement and achievement. Learners are motivated when they can see the value of learning for their own goals.
- 1.2 Adult learners develop expertise by building on their existing knowledge, skills and experiences.
- Effective teaching and learning focus on the development of learners' conceptual understandings through meaningful learning experiences.
  - Teaching approaches, such as those that are based on constructivist theory, should build on learners' existing knowledge, experiences and understandings, and support individuals to actively construct meaning for themselves.
  - As learners develop expertise in a field they become increasingly able to structure their knowledge and develop metacognitive strategies that allow them to monitor their own learning.
  - To support adults to learn by building on their existing knowledge, skills and experiences, tutors require a sound knowledge of their subject areas and how aspects of learning in those areas are interrelated.
- 1.3 Adult learners develop their literacy and numeracy most effectively in contexts that have meaning to them. As learners develop their expertise, their increasing awareness of their knowledge and skills allows them to apply them in a wide range of contexts.
- Thinking and learning depend greatly on the social and cultural contexts in which they occur.
  - Learning can be transferred from instructional contexts to work or other everyday situations. Transfer is enabled when instruction is meaningful and learners can see that their learning will be of use to them in their everyday lives.
  - Learning is increased through interaction with more knowledgeable individuals who can scaffold developing understandings.
- 1.4 Adults who have experienced repeated failure are likely to feel anxious and reluctant to engage in further learning.
- Where teaching approaches focus exclusively on correct answers and provide little cognitive support, adult learners who have experienced repeated failure may develop negative perceptions of their own ability.
  - Mathematics anxiety decreases the efficiency of the working memory and makes it difficult for individuals to think logically. Adults who have not learned to read or write may see themselves as unable to master literacy skills.
  - Educators who model positive attitudes towards literacy and/or numeracy and instruction focused on relevant content in meaningful contexts have been found to positively influence the attitudes of anxious learners.

## **2. The features of effective embedded literacy and numeracy provision**

2.1 Successful approaches to embedding literacy and numeracy clearly link the literacy, numeracy and vocational components of the course.

- Links between literacy and numeracy learning and vocational learning are clearly and explicitly identified.
- Explicit literacy and numeracy instruction is provided as it is required for the vocational task at hand.
- Teaching and learning materials reflect use of literacy and numeracy within the vocation, and are differentiated for learners' varying literacy and numeracy needs.

2.2 Where tutors work as a team, learners are more likely to stay in training and complete literacy and/or numeracy qualifications in addition to vocational qualifications.

- Successful team approaches may involve tutors in joint planning, observation and team teaching as appropriate. Regardless of the approach used, tutors require sufficient time to be allocated to enable them to work together.
- Team approaches are supported where literacy, numeracy and vocational tutors have opportunities to learn from each other.
- Effective teaching teams in adult education are learner focused and share responsibility for learner progress.

2.3 Effective assessment in programmes where literacy and numeracy are embedded makes use of Learning Progressions to provide direction for teaching programmes and to monitor progress toward learning goals.

- Learning continuums describe the growth of knowledge and skills that occurs as learners develop their expertise in a particular area.
- Diagnostic and formative assessment that maps student progress against Learning Progressions provides valuable direction for teaching programmes.
- A range of successful assessment procedures provides both formal and informal feedback to learners about their progress.
- Appropriate literacy and numeracy assessment instruments are useful in adult education.

2.4 Embedded literacy and numeracy provision is facilitated by appropriate organisational policies, management structures, resourcing and working conditions.

- Institutions that adopt a whole-organisation approach to the development and support of embedded programmes are most likely to be effective.
- It is important for administrative procedures and the allocation of practical resources to reflect the importance of literacy, numeracy and vocational learning.

## **3. The workplace as a context for strengthening literacy and numeracy**

3.2 Changes in the nature of work mean that companies have to be more sophisticated if they are to compete effectively in a modern, global market.

- Greater flexibility and higher skill levels are required as the nature of work changes.
- The number of unskilled jobs is diminishing.
- The increasing pace of technological change affects workers at all levels.

- Flexible training opportunities are required to meet the needs of a wide range of employers and employees

3.3 To participate successfully in new work processes, adults need to participate in workplace learning that is underpinned by literacy and numeracy skills.

- Increasingly, employers seek workers with literacy skills.
- Employees with low literacy skills are less likely to take part in any kind of industry training and may be less able to benefit from or participate in workplace learning.
- Reducing literacy and numeracy demands is not an adequate long-term response.

3.4 There are benefits for employers and employees when employees increase their literacy and numeracy skills.

- Increased literacy and numeracy skills may have direct bottom-line benefits.
- There are often other less tangible benefits for companies.
- Workplaces that support workplace literacy and numeracy learning share some common characteristics.

3.5 Employers need support to make and act upon the connections between literacy and numeracy, job performance and productivity.

- Employers are often unaware of literacy and numeracy issues in their organizations.
- Employers usually need support to analyse the literacy and numeracy demands of roles within an industry or business.
- Employers usually need support to select appropriate literacy and numeracy interventions, which can often be incorporated into vocational training.

## **4. Effective learning materials and how to develop them to strengthen literacy and numeracy**

## **5. The role of assessment in strengthening literacy and numeracy**

## **6. Managing and sustaining change to achieve effective long-term embedding of literacy and numeracy**

6.1 Organisations are more likely to develop and maintain effective approaches to embedding literacy and numeracy when the value of literacy and numeracy is understood and literacy and numeracy are viewed as integral parts of vocational training.

- Approaches are more likely to be sustained where managers understand that embedded literacy and numeracy are effective in increasing participation and raising achievement.
- Literacy and numeracy teaching is more likely to be effective where it is regarded as an integral part of vocational training.
- Tutors and employers play a key role in communicating the value of literacy and numeracy skills to learners.

6.2 Teaching materials are important tools that can substantially influence the content and enactment of instruction.

- Teaching materials are tools used by tutors as they design instructional programmes. The ways in which tutors use teaching materials are dependent upon their own understandings, the understandings and characteristics of the learners they teach, and the contexts of instruction.
- Because teaching materials directly influence the process of teaching they have been widely used as a tool in instructional reform.
- Teaching materials need to be developed in ways that clearly anticipate the role of the tutor in implementation, and include important information that enables tutors to make decisions about how and when to use the material presented.

6.3 Professional development programmes can be effective in improving tutor practice and learner performance.

- Effective professional development programmes focus directly on the link between learning and tutor practice.
- Effective professional development programmes support tutors to identify and examine their current understandings and approaches as they develop their professional knowledge base.
- Ongoing professional development programmes support tutors to take responsibility for student learning and this provides a sound basis for continuous improvements to knowledge and practice.

6.4 Assessment data provides valuable information that can be used systematically to improve programmes.

- Continuous programme improvement requires organisations to clearly specify learning goals, systematically monitor the progress of all learners towards these goals and then revise teaching programmes on the basis of this information.
- Individual and aggregate measures of achievement enable organisations to focus on improving the performance of both individual learners and the organisation as a whole.
- Professional learning communities can successfully effect and sustain change by highlighting learner performance.

# Detailed description of each key understanding

## 1. How adults develop their literacy and numeracy expertise

### Key understanding 1.1

*Adults engage in learning for their own larger purposes. These purposes are associated with their roles in society as workers, family members and community members.*

#### Research findings

Children attend school because of legal mandates and strong social and cultural forces that view school as the “work of childhood” (Comings, Parrella, & Soricone, 2000, p. 1). In contrast, adults generally make an active choice to participate in educational programmes and they do so in order to achieve broad purposes in their lives.

We undertake cognitive tasks not merely as ends in themselves but as a means for achieving larger objectives and goals that have meaning in the community (Scribner, 1988).

Adults seek to develop their literacy and numeracy skills in order to gain access to information, give voice to their opinions and ideas, take action to solve problems and create future opportunities in the form of further qualifications. Achieving the purposes they set for themselves enables adults to effectively fulfil their roles in society as workers, family members and community members.

Adults are more likely to engage in learning programmes for sustained periods and achieve success when it is clear to them how their learning is linked to their own particular purposes. Transparent learning programmes acknowledge and support learners by helping them to establish specific learning goals in line with their purposes. In addition, where learners are involved in monitoring their progress towards learning goals they are more likely to persist and achieve success in learning programmes.

Motivation is a key factor in engagement and achievement. Learners are motivated when they can see the value of learning for their own goals. Adults are more likely to be motivated to engage with literacy and numeracy learning when it is embedded within a vocational or leisure course which is their primary motivation.

#### Implications for practice

Adult learners are more likely to be engaged and achieve success when:

- Learning programmes clearly articulate course content and outcomes to enable adults to be clear about how the learning links with their own particular purposes.
- Course information is clear, unambiguous and accessible. Specific examples of content can be useful in communicating with potential learners.
- Adult learners are involved in setting learning goals and monitoring their progress towards these.
- Learning activities incorporate clearly specified outcomes.

Embedding literacy and numeracy learning within vocational courses will increase adults’ motivation for developing their knowledge and skills in literacy and numeracy.

**References:** Bingman & Stein, 2001; Coben, 2003; Comings, Parrella, & Soricone, 2000; Gillespie, 2002; Gunnarsson, 1997; Roberts, et al., 2005; Scribner, 1988; Swain, et al., 2005.

## **Key understanding 1.2**

*Adult learners develop expertise by building on their existing knowledge, skills and experiences.*

### **Research findings**

Learners actively construct knowledge as they make sense of new information and experiences by extending or changing their current ideas and understandings (schema). A constructivist approach to teaching and learning focuses on supporting learners to develop expertise through meaningful learning experiences that build on their existing knowledge. (This is in contrast to a behaviourist approach where skills and knowledge are developed through reinforcement.)

Within this approach, the role of the tutor is to support individuals to actively construct meaning for themselves.

... taking a constructivist approach to building knowledge and skills focuses on helping students develop their understanding and make sense of the world (Bingman & Stein, 2001, p. 19).

Instruction is aimed at developing a “richly structured knowledge base” (Gillespie, 2002, p. 2) by activating prior knowledge and building on the schema learners have. The connections between areas of learning are valued and emphasis is given to the ways in which different areas of content are related.

Teaching is deliberately focused on supporting learners to develop control over strategies by ensuring they have a sound and secure knowledge base. As learners develop expertise in a field they become increasingly aware of the key concepts and/or strategies that help them to structure and utilise their knowledge.

As they develop expertise, learners can be supported to develop metacognitive strategies similar to those used by experts to monitor and control their own thinking processes. Assisting learners to develop and measure their success by reflecting on what they have learnt helps them to take responsibility for their learning and develop independent learning and study skills. It also assists them to adapt their knowledge and skills for different contexts or problems (transfer).

To support adults to learn by building on their existing knowledge and experiences, tutors require a sound conceptual understanding of their subject area and an appreciation of the ways in which different aspects of learning within their area are related. Effective teachers of literacy and/or numeracy possess deep knowledge of the ways in which expertise in these areas is developed and, in particular, of how learners build metacognition that enables them to become independent and to transfer their skills to new contexts.

### **Implications for practice**

Teaching and learning approaches that effectively build on adults’ existing knowledge and skills:

- acknowledge and value learners’ existing knowledge by supporting them to identify their current understandings and investigate these in the process of building their expertise
- are focused on the development of conceptual understandings and flexible strategy use rather than the memorisation of facts, rules or procedures
- develop reflective and critical thinking and reasoning
- utilise teaching and learning activities that are relevant and meaningful to learners

- articulate key ideas or strategies and organise learning around these
- make explicit links between areas of learning
- support learners to reflect on their own learning in order to gain increased control over their own thinking processes and develop independent study skills, and
- promote the development of conceptual knowledge among tutors.

**References:** Anderson, 2004; Askew, et al., 1997; Bingman & Stein, 2001; Cobb, 1994; Coben, 2003; Fosnot, 1996; Gillespie, 2002; Ma, 1999; Piaget, 1978; Swain, et al., 2005; von Glasersfeld, 1995.

### **Key understanding 1.3**

*Adult learners develop their literacy and numeracy most effectively in contexts that have meaning to them. As learners develop their expertise, their increasing awareness of their knowledge and skills allows them to apply them in a wide range of contexts.*

#### **Research findings**

A large body of literature has demonstrated that adults' thinking is influenced by the social and cultural contexts in which it occurs. Learning is optimised when it is made as relevant as possible to learners' lives (including their chosen and required roles as adults), the problems they face and the contexts in which these arise.

Adult learning is recognised as a form of participation in social practices: learning is enhanced by social interaction. Vygotsky and other researchers working in the socio-cultural tradition highlight the importance of social interaction in teaching and learning programmes. These researchers outline how learning is enhanced through interaction with more knowledgeable individuals who can scaffold developing understandings. Where adults work collaboratively to develop knowledge and skills in a social context a learning community is developed and new understandings are generated.

Several factors have been found to influence the transfer of learning from instructional contexts to work or other everyday situations. Learning is more easily transferred where learners are aware of the "underlying principles, patterns and relationships" (Gillespie, 2002, p. 1) within content; where instruction is linked to larger ideas that can be translated across contexts, learners are more likely to make this translation. Learners are also more likely to gain transferable knowledge when the instruction is meaningful. Instruction is meaningful for learners when it is engaging and the tasks enable learners to see that their learning will be of use to them in their everyday lives. Such tasks do not necessarily need to mirror an authentic everyday situation. In addition, approaches that acknowledge students' own use of problem-solving strategies and that encourage them to articulate these have also been found to enable transfer.

#### **Implications for practice**

Learners will develop literacy and numeracy skills, and are most likely to transfer their learning to new contexts, where teaching and learning programmes:

- clearly convey the key principles and larger ideas within the subject area
- engage learners in meaningful contexts and authentic tasks, and
- support students to articulate their own use of strategies for problem solving.

Learning is increased where learners are part of a collaborative learning community and are given opportunities to:

- be supported by more knowledgeable individuals
- support each other's learning by giving and receiving assistance and advice, and
- engage in group work.

**References:** Bingman & Stein, 2001; Bruner, 1985; Carraher & Schliemann, 2002; Cobb, 1994; Coben, 2003; Evans, 2000; Gillespie, 2002; Lave, 1988; Saxe, 1988; Swain, et al., 2005; Vygotsky, 1987.

## **Key understanding 1.4**

*Adults who have experienced repeated failure are likely to feel anxious and reluctant to engage in further learning.*

## **Research findings**

Where teaching approaches focus exclusively on correct answers and provide little cognitive support, learners who have experienced repeated failure may develop negative perceptions of their own ability. For some adults attempting numeracy learning, this can contribute to the development of “mathematics anxiety”. Although mathematics anxiety generally develops in childhood, its effects are still felt in adulthood and it is widespread throughout the population.

Math anxiety is a bona fide anxiety reaction, a phobia with both immediate cognitive and long-term educational implications (Ashcraft, 2002, p. 184).

Mathematics anxiety decreases the efficiency of an individual’s working memory because intrusive thoughts and worries take the focus away from the mathematics task at hand. This makes it difficult for individuals to think logically and results in increased errors and longer processing times when solving problems mentally. In the long term, mathematics anxiety leads to decreased competence and reduced course completion rates, which may restrict the career options available to adults.

Adults who have not learned to read and write may have similar problems. Previous educational experience is likely to have been difficult and unsuccessful. Learners may see themselves as unable to master basic literacy skills. Some adults will have become disaffected with, and afraid of, learning in traditional education contexts.

Educators who model positive attitudes towards literacy and/or numeracy learning have been found to positively influence the attitudes of anxious learners and mitigate the effects of anxiety on learning. Where learning programmes are focused on relevant content in meaningful contexts and learners are involved in open-ended activities with extended opportunities for problem solving and discussion, anxiety is also reduced.

Adult learners who aspire to a particular job or career will experience a socialisation process as they train for that position. Where literacy and numeracy skills are integral to vocational training, learners accept these as part of their new professional identity, leading to increased motivation and confidence for learning literacy and numeracy, and decreased anxiety.

## **Implications for practice**

Adult literacy and numeracy educators need to be aware that anxiety will be affecting the learning of some course participants.

The effects of anxiety on learning can be mitigated by:

- tutors who model positive attitudes towards literacy and numeracy
- instructional programmes focused on relevant content in meaningful contexts
- teaching and learning programmes that provide learners with extended opportunities for problem solving and discussion, and
- vocational programmes that include literacy and numeracy skills as an integral part of vocational training.

**References:** Ashcraft, 2002; Ashcraft & Kirk, 2001; Coben, 2003; Evans, 2000; Roberts, et al., 2005; Swain, et al., 2005; Torgerson, et al., 2004.

## 2. The features of effective embedded literacy and numeracy provision

### Key understanding 2.1

*Successful approaches to embedding literacy and numeracy clearly link literacy, numeracy and vocational components of the course.*

#### Research findings

Approaches to embedding literacy and numeracy are more likely to be successful where the links between literacy, numeracy and vocational learning are identified clearly and explicitly. In particular, vocational, literacy and numeracy tutors need to understand the ways in which literacy and numeracy are used in vocational tasks and the literacy and numeracy demands of the learning environment.

Research into effective embedded literacy and numeracy approaches emphasises the importance of the relative timing of literacy, numeracy and vocational instruction. To be effective, literacy and numeracy support needs to be delivered as it is required for the instructional or vocational task at hand. This ensures that the literacy and/or numeracy delivered is “wholly and immediately relevant” (Bates, 2005, p. 26) to learners and helps them to achieve success in the vocational area. Ideally, this support is provided as learners are engaged in a practical task, rather than in a separate classroom and a different time. However, separate provision can be effective if it is closely linked to the vocational learning and taught by tutors who clearly understand and articulate these links.

Once the connections between literacy, numeracy and vocational learning have been established, it is important for all aspects of the teaching and learning programmes to reflect these links. In particular, learning materials will be more relevant for learners where these links are clear, and differentiating these materials for learners’ varying literacy and numeracy needs will increase their accessibility.

#### Implications for practice

Vocational programmes will more effectively integrate literacy and numeracy learning where:

- there are clear and explicit links between vocational, literacy and numeracy content
- vocational, literacy and numeracy tutors understand the ways in which literacy and numeracy are used in specific vocational tasks and activities
- vocational, literacy and numeracy tutors understand the literacy and numeracy requirements of the learning environment
- literacy and numeracy instruction is delivered as it is required for vocational learning
- the connections between literacy, numeracy and vocational learning are clearly evident in teaching materials
- teaching and learning materials are differentiated for learners’ varying literacy and numeracy needs.

**References:** Bates, 2005; Casey, et al., 2006; Cranmer, et al., 2004; National Research and Development Centre for Adult Literacy and Development, 2006; Roberts, et al., 2005.

## Key understanding 2.2

*Where tutors work as a team, learners are more likely to stay in training and complete literacy and/or numeracy qualifications in addition to vocational qualifications.*

### Research findings

Successful teacher teams are strongly motivated to provide embedded provision; they have time to plan and work together, and are willing to learn from each other (National Research and Development Centre for Adult Literacy and Development, 2006).

The implementation of a team approach by vocational, literacy, numeracy and learning support tutors is strongly linked to the effectiveness of embedded literacy and numeracy approaches. However, the ways in which tutors operate as a team vary according to their knowledge, skills and the constraints of the vocational course in which they work. Effective approaches in adult education may involve tutors working collaboratively by planning together, by sharing teaching time and space, team teaching or observing each other at work with learners. Because the relationship between vocational, literacy and numeracy learning is dynamic, tutors need to be able to work together flexibly and recognise the changing priorities at any one time during the vocational training. Regardless of the approach taken, common to all successful teams is the need for vocational, literacy, numeracy and learning support tutors to have sufficient time allocated to work together.

Team approaches are supported where literacy, numeracy and vocational tutors have opportunities to learn from each other. Studies investigating embedded approaches emphasise the “importance of teamwork, underpinned by a level of understanding, on the part of both LLN [literacy, language and numeracy] and vocational teachers, of one another’s work” (Casey, et al., 2006, p. 31). In particular, literacy and numeracy tutors need to understand how literacy and numeracy are used both in the classroom and in the workplace that learners are training for. Conversely, vocational tutors require an understanding of the importance of literacy and numeracy, and an ability to adapt vocational content and teaching approaches to reflect the key literacy and numeracy demands involved in each.

Effective teaching teams in adult education are learner focused and share responsibility for learner progress. In practice, this means tutors share vocational objectives for learners and regularly discuss learner progress using shared achievement information.

### Implications for practice

Vocational programmes are more likely to effectively embed literacy and numeracy learning where tutors work as a team. Effective team approaches are those in which:

- vocational, literacy, numeracy and learning support tutors have time allocated to work together
- the model of delivery incorporates teamwork in a way that is appropriate for the tutors, students and vocational objectives of the course that they deliver
- joint planning, team teaching and opportunities for tutors to observe each other teaching are used flexibly within teaching and learning programmes
- vocational, literacy and numeracy tutors have opportunities to learn from each other and gain an understanding of each other’s areas, and
- tutors discuss learner progress using shared achievement information.

**References:** Bates, 2005; Casey, et al., 2006; Cranmer, et al., 2004; Ivanić et al, 2006; National Research and Development Centre for Adult Literacy and Development, 2006; Roberts, et al., 2005; Swain, et al., 2005.

## Key understanding 2.3

*Effective assessment in programmes where literacy and numeracy are embedded makes use of Learning Progressions to provide direction for teaching programmes and to monitor progress toward learning goals.*

### Research findings

A learning continuum, or progression, clearly describes the growth of knowledge and skills that occurs as learners develop their expertise in a particular area. Effective progressions focus on more than the acquisition of facts or isolated skills; they describe important aspects of learning that distinguish novice from expert. This includes a range of developing skills and abilities, the fluency and independence with which new skills can be applied and the range of situations they can be applied to. Where there are clearly described Learning Progressions that are consistent with the goals of the programme, these can be used to help ensure students' developing knowledge is relevant to the vocation they are training for and useful in achieving their purposes.

Learning Progressions provide valuable direction for teaching programmes. Effective diagnostic assessment establishes where a learner is initially placed on the progression by identifying their current skills and understandings. Teaching can then be directed towards developing the knowledge required to move the learner along the progression. As teaching continues, formative assessment provides information about a learner's progress towards learning goals.

Successful embedded literacy and numeracy provision makes use of diagnostic and formative assessment procedures to provide both formal and informal feedback to learners about their progress. Where learners have a clear picture of their current skills and next learning steps in relation to their learning goals, they are more likely to feel motivated and confident about their learning.

Researchers in adult literacy and numeracy education consider there to be a lack of effective assessment instruments available. They describe the need for the development of meaningful forms of assessment that focus on developing real skills rather than requiring respondents to answer formal types of test questions.

### Implications for practice

Effective assessment procedures:

- make use of Learning Progressions that clearly describe how learners' knowledge and skills will grow as they develop their expertise
- use diagnostic assessment information to establish where a learner is initially placed on the learning progression by identifying their current skills and understandings
- use formative assessment to monitor learners' progress towards learning goals, and
- provide formal and informal information to learners about their progress.

**References:** Bingman & Stein, 2001; Casey, et al., 2006; Coben, 2003; Cranmer, et al., 2004; Cumming & Gal, 2000; Stities, 2002; Swain, et al., 2005; Tertiary Education Commission, 2008; Tertiary Education Commission, 2008; Torgerson, et al., 2004.

## **Key understanding 2.4**

*Embedded literacy and numeracy provision is facilitated by appropriate organisational policies, management structures, resourcing and working conditions.*

### **Research findings**

Embedded literacy and numeracy provision is more likely to be successful in organisations that adopt a whole-organisation approach to the development and support of embedded programmes. In particular, researchers agree on the importance of managerial support in the development of successful programmes.

Support for embedding from senior and middle managers through institution-wide policies makes it easier to direct resources in ways that will support embedded LLN (Casey, et al., 2006, p. 32).

The importance of aligning organisational policies, management structures, resourcing and working conditions with effective embedded provision is well recognised in the research literature. Research focused on the development of effective practices to support embedded provision provides examples of the practical ways organisations can support embedded literacy and numeracy learning. In particular, the importance has been identified of appropriate course documentation, organisational policies such as professional development and staff promotion policies, job descriptions and performance management systems. Additional practical constraints such as timetables, teaching spaces and teaching and learning resources have also been identified as factors that support the provision of embedded literacy and numeracy programmes.

### **Implications for practice**

Organisations can support the effective provision of embedded literacy and numeracy programmes by ensuring:

- entry requirements for vocational courses clearly specify required literacy and numeracy
- course objectives and goals incorporate literacy, numeracy and vocational goals
- the professional development policy supports literacy and numeracy tutors to increase their understanding of the vocation, and vocational tutors to increase their understanding of literacy and numeracy
- the staff promotion policy incorporates aspects of literacy and numeracy learning
- job descriptions clearly define the different roles of teaching staff in delivering embedded programmes
- performance management systems reflect the importance of literacy and numeracy within vocational programmes
- timetabling allows for aspects of teamwork and sufficient contact time, and
- teaching facilities and equipment are distributed to support literacy, numeracy and vocational learning.

**References:** Casey, et al., 2006; DfES, n.d.; Govers, 2008; Roberts, et al., 2005.

### **3. The workplace as a context for strengthening literacy and numeracy**

#### **Key understanding 3.1**

*Changes in the nature of work mean companies have to be more sophisticated if they are to compete effectively, particularly in a global market. This means engaging a wide range of employees in learning.*

#### **Research findings**

Employers need greater flexibility and higher levels of skills from their workforce as work becomes more complex and uncertain, the number of unskilled jobs diminishes and the pace of technological change increases. This applies to employees throughout organisations, including on the factory or shop floor.

The workplace is one of the most important contexts in which adults learn. Employees need a range of generic and industry-specific skills and competencies for their current and future employment which means they need to participate in training throughout their working lives. Employers need staff capable of fulfilling current roles and of handling changes in work processes. Investing in a competent and learning-oriented workforce is one way for employers to build a competitive advantage.

Employees may be involved in learning through formal on- and off- job training linked to national qualifications. They may receive training linked primarily to the particular demands of a specific workplace or they may be learning on the job in ways that are informal and not accredited (taking place as a side effect of work).

#### **Implications for practice**

Learning focused on workplace needs is likely to be motivating for many adults. This includes workplace literacy programmes as well as other off-job training opportunities where literacy and numeracy skills can be embedded.

(MacCormick, 2008; Tynjälä, 2008; Vaughan, 2008) (Ryan, 2007)

## **Key understanding 3.2**

*To participate successfully in new work processes, adults need to participate in workplace learning that is underpinned by literacy and numeracy skills.*

### **Research findings**

To participate successfully in new work processes (such as multi-skilled or self-managing teams, or new quality and compliance regimes) employees require some degree of competence in 'soft skills' such as communicating effectively, building relationships and managing and understanding information from a range of sources. Adults need oral language, literacy and numeracy skills in order to learn these new skills and effectively participate in training.

In the past these skills did not matter as much. Many people currently in employment entered the workforce when there were fewer expectations for the general workforce to have these skills, but employers increasingly seek employees with literacy and numeracy skills.

Employees with low literacy and numeracy skills are less likely to take part in any kind of industry training and may be less able to benefit from or participate in workplace learning. Unless this is actively changed, these workers will not have the increased skills they need to adapt to workplace changes in the future. Changes include the increasing demand for quality processes and compliance regimes (e.g. health and safety or environmental health) and the increased use of technology in the workplace. Thus, unaddressed low workplace literacy levels will reduce the ability of businesses to become more productive.

The overall capacity of companies to handle new processes or challenges is not enhanced when employers try to reduce the amount of literacy and numeracy expected of employees in low skilled jobs. Some employees lose the literacy and numeracy skills they start with because they don't have the opportunity to use them on the job. If employers move staff out of areas requiring literacy, develop oral cultures, change work practices and rewrite documentation, employees are less able to participate in other changes that may affect the workplace in the future. Also, endeavouring to strip out literacy and numeracy often means responsibility for literacy and numeracy tasks moves to charge hands and team leaders, making their jobs more demanding

### **Implications for practice**

Organisations involved in the design and delivery of workforce-related training need to consider current and future needs for literacy and numeracy skills and should endeavour to address these as part of their training programmes.

(Benseman & Sutton, 2007; Gray, 2006; Lander, 2005; Levenson, 2004; MacCormick, 2008; Reid, 2008; Workbase, Workbase, 2006a, 2006b, 2006c)

### **Key understanding 3.3**

*There are benefits for employers and employees when employees increase their literacy and numeracy skills.*

#### **Research findings**

Employers benefit when employees increase their skills to meet the literacy and numeracy demands of workplaces. There may be direct bottom line benefits such as:

- increased job outputs
- reduced error rates and less time per task (by both supervisors and employees)
- reduced wastage
- accident reduction
- improved quality of work
- better staff retention
- a reduction of absenteeism.

There are often other important but less tangible benefits, such as:

- better team performance
- increased participation in team and other work meetings
- improved capacity to cope with change
- improved health and safety
- improved customer satisfaction
- a greater understanding of the company's 'big picture'
- increased take up and achievement in vocational training.

Participation in workforce literacy programmes also helps employees, who report a range of benefits including the opportunity to progress in their jobs, more job satisfaction, and an improved sense of self-worth.

Employees also benefit in the longer-term if their literacy skills improve. Higher literacy has a “persistent, positive and statistically significant association with people’s labour force status” (Johnston, 2004, p. 35) i.e. people with better literacy skills are more likely to be employed, and to earn more, than people with low literacy.

#### **Implications for practice**

Workplaces that support learning and in particular workplace literacy and numeracy learning have some characteristics in common:

- They have a commitment to investing in training and staff development.
- There is a company champion who makes literacy and numeracy a corporate priority and obtains and maintains a commitment to invest in literacy skills development
- Management practices communicate the benefits of training to all staff, they involve staff in training development and delivery and they continuously market the training internally to all concerned.
- Quality partnerships exist between employers, unions, Industry Training Organisations and training providers.
- Employees are given the opportunity to apply their new skills.

(Benseman & Sutton, 2007; Business NZ, New Zealand Council of Trade Unions, Industry Training Federation, & Workbase, 2007; Gray, 2006; Hartley & Horne, 2005; Johnston, 2004; Levenson, 2004; MacCormick, 2008; Reid, 2008; Ryan, 2007; Tynjälä, 2008; Vaughan, 2008, Workbase, 2006a)

### **Key understanding 3.4**

*Employers need support to make and act upon the connections between literacy and numeracy, job performance and productivity.*

#### **Research findings**

Employers are often not aware of literacy and numeracy issues in their organisations and may need support to make the connections between literacy and numeracy issues and job performance and productivity. This includes support to recognise the literacy and numeracy knowledge and skills that underpin particular tasks or that are required to adopt new work practices or that are implicated in workplace problems.

Sometimes the mix and range of literacy, spoken language and numeracy skills needed to complete common workplace tasks are not evident to employers (or supervisors and employees themselves) who think of these skills as 'just common sense'. For example, an employee uses a combination of reading, writing, numeracy and speaking and listening skills when they:

- read a materials specification sheet
- listen to an instruction about a change to the schedule of production for the day
- ask questions and talk the change over with coworkers
- read production data from a display unit on a particular machine
- understand and interpret the key tolerances and measurements behind the data, and
- record that data.

#### **Implications for practice**

Employers value information on how to recognise literacy and numeracy issues in the workplace. This may include information that help employers with:

- analysing the literacy and numeracy in specific job roles or within a particular industry often helps make the skills implicit in the job more visible
- understanding the skills mix of staff through an organisation needs analysis
- identifying the literacy and numeracy skills required where there are problems such as high product wastage or compliance issues. This information can clarify the reasons for the mistakes .

Employers may also need support and guidance or criteria to assist them select an appropriate intervention such as:

- redeveloping workplace documentation to make it clearer
- rewriting induction training for health and safety training
- providing staff with an opportunity to use the literacy and numeracy skills they have and those they acquire during training
- training supervisors in managing multi-lingual and multi-cultural teams
- selecting an appropriate provider to deliver workplace literacy programmes.

(Benseman & Sutton, 2007; Gray, 2006; Hartley & Horne, 2005; Workbase, 2006a, 2006c, 2006d)

## **4 Managing and sustaining change to achieve effective long-term embedding of literacy and numeracy**

### **Key understanding 4.1**

*Organisations are more likely to develop and maintain effective approaches to embedding literacy and numeracy when the value of literacy and numeracy is understood, and literacy and numeracy are viewed as integral parts of vocational training.*

### **Research findings**

Senior managers play a key role in developing and maintaining embedded literacy and numeracy programmes. When managers understand that embedded literacy and numeracy are effective in increasing participation and raising achievement, programmes are more likely to be sustained. In addition to understanding the benefits of embedded literacy and numeracy, it is important for managers to “fully understand the implications of embedding, both in terms of the practical support it requires but also in terms of pedagogy and teachers’ expertise” (Casey, et al., 2006, p. 45). Where managerial support is provided, the effective embedded approaches developed by committed and enthusiastic tutors are more likely to be utilised by other tutors.

Literacy and numeracy teaching is more likely to be effective when literacy and numeracy are regarded as integral parts of vocational training. This is in contrast to approaches that view literacy and numeracy as optional, required only by those learners who need additional learning support.

Learners improve their literacy, numeracy and other key skills when the whole organisation believes key skills are an essential underpinning for learning vocational skills and technical knowledge (Cranmer, et al., 2004, p. 4).

By positioning literacy and numeracy as essential parts of vocational training the stigma associated with needing assistance is reduced, so learners are more likely to succeed.

Learners who appreciate the value of literacy and numeracy skills for their future career opportunities are more likely to be motivated and achieve success. Tutors and employers play a key role in communicating the value of literacy and numeracy skills to learners. Vocational tutors are more likely to be able to effectively communicate the value of literacy and numeracy skills to learners with regard to their career aspirations because they “... have a natural legitimacy ... in the eyes of the learners [because] they represent the role to which the learner aspires” (Roberts, et al., 2005, p. 9). Employers also play a key role in communicating the value of literacy and numeracy to learners. The active involvement and support of employers increase learner motivation and engagement.

### **Implications for practice**

Effective embedded approaches to literacy and numeracy are more likely to be developed and maintained when:

- managers understand that embedded literacy and numeracy are effective in increasing participation and raising achievement
- literacy and numeracy are regarded as integral parts of vocational training, rather than additional support for those with particular learning needs
- tutors effectively communicate the value of literacy and numeracy to learners with regard to their future career opportunities, and
- employers are actively involved in learning and support learners’ attendance.

**References:** Bates, 2005; Casey, et al., 2006; Cranmer, et al., 2004; National Research and Development Centre for Adult Literacy and Development, 2006; Roberts, et al., 2005; Sagan, et al., 2005; Swain, et al., 2005.

## **Key understanding 4.2**

*Teaching materials are important tools that can substantially influence the content and enactment of instruction.*

### **Research findings**

Teaching can be understood as a process of design.

Teachers perceive and interpret existing resources, evaluate the constraints of the classroom setting, balance tradeoffs and devise strategies – all in the pursuit of their instructional goals (Brown & Edelson, 2003, p. 1).

Within this view, curriculum materials are a tool used by tutors as they design instructional programmes. The ways in which tutors use learning materials are dependent upon their own understandings, the understandings and characteristics of the students they teach, and the contexts of instruction. Where tutors have a sound understanding of content they tend to improvise instruction, devising learning activities independently from teaching resources. By contrast, where tutors lack understanding, they place responsibility for learning onto teaching materials, following set instructional activities and sequences. Between these two extremes, tutors adapt learning programmes by modifying teaching materials to better address student needs, fit with their teaching style or align with classroom circumstances.

Researchers in this area use the term “enacted curriculum” to acknowledge the difference between the teaching and learning that take place in the classroom and the teaching and learning intended by content frameworks and the developers of teaching materials. This term acknowledges the active role of educators in designing instruction: “... the enacted curriculum is actually jointly constructed by teachers, students, and materials in particular contexts” (Ball & Cohen, 1996, p. 7).

Because teaching materials directly influence the process of teaching they have been used widely as a tool in instructional reform.

A primary lure of curriculum materials is that, of all the different instruments for conveying educational policies, they exert perhaps the most direct influence on the tasks that teachers actually do with their students each day in the classroom (Brown & Edelson, 2003, p. 1).

Researchers evaluating the effectiveness of such reforms stress that “... the materials themselves matter in teacher interactions with curriculum materials ...” (Remillard, 2005, p. 240). They outline that curriculum materials need to be developed in ways that clearly anticipate the role of the tutor in curriculum design. In particular, teaching materials need to include important information that enables tutors to make decisions about how and when to use the material presented. This information may include descriptions of content, effective ways to represent key concepts and the benefits and limitations of these, and information about probable learner responses and the reasoning behind these.

### **Implications for practice**

Effective teaching materials will anticipate the role of the tutor in curriculum design and therefore:

- include descriptions of important content knowledge
- include important representations that can be used to communicate key content to learners and provide information about how these can be used in teaching
- include information about probable learner responses and the reasoning behind these

- include information about the ways in which aspects of learning are related, both in terms of conceptual ideas and across time
- are relevant to tutors' current understandings, and
- are written and presented in ways that communicate effectively with tutors.

**References:** Ball, 1990; Ball & Cohen, 1996; Ben-Peretz, 1990; Brown & Edelson, 2003; Cohen & Ball, 1999; Pea, 1993; Remillard, 2005; Schmitt, 2000; Sherin & Drake, 2004; Spillane, 2006.

### **Key understanding 4.3**

*Professional development programmes can be effective in improving tutor practice and learner performance.*

#### **Research findings**

Effective professional development programmes are those that focus clearly on the link between learning and tutor practice. As an outcome of such programmes, tutors understand the ways in which their own practice affects the learning that occurs in their classrooms: “The core question is, what do we as teachers need to do to promote the learning of our students?” (Timperley, 2008, p. 11).

Efforts to improve instruction are most likely to produce genuine changes to practice when programmes are focused on developing the professional knowledge base of tutors. Tutors require a comprehensive knowledge of the subject, an understanding of how to teach key concepts effectively and an awareness of how to assess learners’ progress in the area.

Successful professional development efforts are those that help teachers to acquire or develop new ways of thinking about learning, learners, and subject matter, thus constructing a professional knowledge base that will enable them to teach students in more powerful and meaningful ways (Borko & Putnam, 1995, p. 60).

By contrast, where tutor knowledge is not engaged and extended in professional development programmes, participating tutors are likely to adopt surface features of the new approach while maintaining the core content of their previous practice.

Effective professional development programmes provide opportunities for tutors to connect their professional learning with their current understandings and approaches. Because “... teachers’ knowledge and beliefs affect how they perceive and act on various messages about changing their teaching” (Borko & Putnam, 1995, p. 59), effective programmes support tutors to clarify their own understandings as they build a professional knowledge base. Effective programmes also address the contexts in which participating tutors’ work. New approaches are introduced in a way that “is consistent with the principles of effective teaching but also systematically assists teachers to translate those principles into locally adapted applications” (Timperley, 2008, p. 9).

Research suggests that when tutors are involved in ongoing professional development programmes that are clearly linked to their current teaching situation, they are more likely to take increased responsibility for learner achievement and develop effective teaching practices.

Change appears to be promoted by a cyclical process in which teachers: have their current assumptions challenged by the demonstration of effective alternative practice, develop new knowledge and skills, make small changes to practice, and observe resulting improvements in student outcomes (Timperley, 2008, p. 14).

Where tutors take responsibility for learner achievement there is a sound basis for continual improvement to knowledge and practice.

Research into effective embedded literacy and numeracy provision highlights the importance of professional development for both the vocational and the literacy and numeracy tutors. In particular, vocational tutors need support to increase their understanding of learners’ varying literacy and numeracy needs and develop their knowledge of how literacy and numeracy are used in vocational tasks. Literacy and numeracy tutors need support to develop teaching approaches that are guided by vocational content and recognise the role of literacy and

numeracy in the vocation. Both vocational tutors and literacy and numeracy tutors would benefit from professional development programmes that develop collaborative approaches to teaching.

### **Implications for practice**

Professional development programmes are most likely to lead to improvements in tutor practice and learner performance when:

- tutors are supported to understand the ways in which their own practice affects the learning that occurs in their classrooms
- tutors are supported to identify and examine their current understandings and methods
- tutors are supported to implement new approaches in the specific contexts in which they work
- tutors have an increasing sense of responsibility for learner achievement
- programmes develop tutors' knowledge of content
- programmes develop tutors' understandings of effective pedagogy
- programmes develop tutors' knowledge of how to assess learners' progress
- programmes engage tutors in a range of learning activities: formal and informal, group and individual, planned and unstructured
- programmes involve tutors in an ongoing cycle of professional development, and
- programmes support tutors to make changes to practice and then observe the effects of these.

In effective embedded literacy and numeracy approaches, professional development programmes:

- support vocational tutors to increase their understanding of learners' varying literacy and numeracy needs and develop their knowledge of how literacy and numeracy are used in vocational tasks
- support literacy and numeracy tutors to develop teaching approaches that are guided by vocational content and recognise the role of literacy and numeracy in the vocation, and
- support the development of collaborative approaches to teaching.

**References:** Askew, et al., 1997; Borko & Putnam, 1995; Butler, et al., 2004; Casey, et al., 2006; Coben, 2003; Franke, et al., 1998; Guskey, 2000; Roberts, et al., 2005; Smylie, 1995; Swain, et al., 2005; Timperley, 2008; Wilson & Berne, 1999.

## Key understanding 4.4

*Assessment data provides valuable information that can be used systematically to improve programmes.*

### Research findings

Research into programme improvement highlights the value of achievement data in the process of improving instruction. Within this approach, the “achievement of student outcomes is the criterion for judging the effectiveness of all other programme practices and components” (Bingman & Stein, 2001, p. 23). Achievement data provides a measure of whether learners are successfully meeting learning goals, and this in turn provides information on the effectiveness of teaching programmes and other organisational practices. An effective model of continuous programme improvement requires organisations to clearly specify learning goals, systematically monitor the progress of all learners towards these goals and then revise teaching programmes on the basis of this information.

This approach is consistent with a learning paradigm perspective that views learning as the key responsibility of educational institutions, while the contrasting instructional paradigm emphasises the delivery of instruction as the primary duty of the organisation.

... in the Learning Paradigm, the power of an environment or approach is judged in terms of its impact on learning. If learning occurs, then the environment has power ... To know this in the learning paradigm we would assess student learning routinely and constantly (Barr & Tagg, 1995, p. 17).

A learning paradigm perspective emphasises the importance of using both individual and aggregate measures of achievement in order to continuously improve the performance of both individual students and the organisation as a whole.

Professional learning communities can successfully effect and sustain change by highlighting learner performance. When tutors work collaboratively to reflect on achievement data and modify teaching approaches “... the entire team gains new insights into what is working and what is not, and members discuss new strategies that they can implement in their classrooms to raise student achievement” (DuFour, 2004, p. 10).

### Implications for practice

Organisations are more likely to engage in ongoing cycles of improvement when systems are established to review achievement information regularly.

The use of assessment data to systematically improve programmes is facilitated when:

- learner performance goals are defined clearly
- effective assessment methods are in place to measure progress towards learning goals
- achievement information is aggregated and analysed regularly
- tutors work collaboratively to reflect on achievement data and modify teaching approaches appropriately, and
- instructional programmes and organisational practices are adapted on the basis of insights gained from assessment information.

**References:** Barr & Tagg, 1995; Bingman & Stein, 2001; DuFour, 2004; Levesque, et al., 1996; Timperley, 2008; US Department of Education, 2003.

## **5. Effective learning materials and how to develop them to strengthen literacy and numeracy**

Coming soon...

## **6. The role of assessment in strengthening literacy and numeracy**

Coming soon...

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## Glossary of Terms

Competency	The knowledge, cognitive and practical skills, and the attitudes (including motivation) needed to meet demands or carry out tasks successfully.
Context, contextualise	Contextualising literacy and numeracy learning means using topics, tasks or situations from the contexts learners are in (for example, a vocational course, a workplace) as the basis for literacy or numeracy instruction.
Course	A specific and prescribed series of instructional or study tasks or sessions. Several courses may together form a programme of study.
Curriculum	The content of a course or programme; the topics, tasks and activities that, together, form the teaching and learning within a course.
Demands	Requirements or needs for a task, for example, the reading skill required to read and interpret a document
Diagnostic	Used to identify, indicate or characterise something. For example, a diagnostic assessment is used to identify specific skills.
Embedded teaching and learning	Teaching and learning of one subject or skill (for example, literacy) within the context and tasks of another subject or skill (for example, panel beating).
Integrated instruction	This term is used to describe the weaving together of vocational instruction with literacy and numeracy instruction. In New Zealand this is now referred to as “embedded instruction”.
Key performance indicators	The most relevant indicators or achievements used to evaluate the work performance of an organisation, a team or person.
Learning support tutor	A tutor who provides support to learners (and/or their tutors) who have learning difficulties. These difficulties typically include literacy or numeracy. Support may be provided in a variety of ways.
Literacy	Literacy is the written and oral language people use in everyday life and work. A person’s literacy refers to the extent of their oral and written language skills and knowledge and their ability to apply these to meet the varied demands of their personal, study and work lives.
Needs	The knowledge, skills and abilities that are necessary in order to perform particular tasks or to carry out particular activities.
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 to

	ability to use their mathematical knowledge to meet the varied demands of their personal, study and work lives.
Outcomes	Results. The achievement of the goals set for a particular programme, course or learners.
Programme	A planned and coordinated sequence of study to achieve a specified aim. A programme is often made up of separate or linked courses.
Qualification	A recognised acknowledgement that a person has satisfactorily completed a prescribed programme or course of study.
Specialist literacy and/or numeracy tutor	A tutor who has expertise in literacy and/or numeracy instruction. Specialist literacy and/or numeracy tutors provide support to learners and other tutors in a variety of ways, most often through supporting embedded literacy and numeracy in vocational or other programmes.
Strengths	Abilities, skills or knowledge.
Teaching team	The group of people who, together, are responsible for instruction within a programme. In a tertiary organisation, teaching teams may comprise a mix of tutors who are specialists in subject, discipline, vocational or work areas as well as tutors who are specialists in teaching literacy and/or numeracy.
Tertiary education organisation	Institutes of technology and polytechnics, universities, wānanga, private training establishments, industry training organisations, other tertiary education providers, rural education activities programmes.
Vocational	Related to work or other purposeful outcomes. Vocational programmes prepare learners for a specific community or employment area or teach general work-related skills.