Adult Literacy and Numeracy: An Overview of the Evidence

Annotated Bibliography

New Zealand Government

Anne Alkema and Jacqualine Rean

CONTENTS

KEY FINDINGS

This annotated bibliography draws on adult literacy, language and numeracy (LLN) research literature from New Zealand, the UK, Ireland, Canada, Australia and the USA. It looks at policy and practice in these countries, the impact of these and implications for work in New Zealand.

The key findings from the literature are:

- Embedding (the practice of combining / integrating literacy and numeracy into vocational and workplace training) improves the likelihood of retention and success when:
    - vocational and literacy tutors work together;
    - literacy and numeracy content is deliberately connected to vocational or real life contexts; and
    - there is a whole of organisation approach.

- LLN programmes in workplaces are successful in attracting learners who would not otherwise participate in learning programmes. These learners improve their attitudes to learning, their LLN and workplace practices, and their employability skills. Programmes work best when:
    - employers understand what literacy and numeracy is and are interested and supportive; and
    - LLN skills are taught in relation to the LLN demands of the job, which are made obvious to learners.

- While there is limited evidence about the connection between proficiency (increased skills) and participation, there is a strong connection between participation and changed literacy and numeracy practices that lead to increased knowledge, skills and motivation. Therefore, there is a need to develop measures of practice that can be used alongside the measures of proficiency to fully ascertain the outcomes for learners;

- The hours of learning needed to achieve LLN skills' gain remain contentious because of the ways in which the researchers describe gain:
    - in the USA, 100 hours of teaching is associated with "measurable gain" described as improving a level / gaining a GED[1];
    - studies in the UK and New Zealand found that "statistically significant" gain was made in 35–39 hours; and
    - short courses are appropriate for those who require a 'brush-up' on skills.

- A qualified teaching workforce is essential, and the more qualified this workforce, the greater progress made by learners. This applies for the teaching of literacy, numeracy and ESOL;

- There are positive signs that ICT engages learners and contributes to LLN skill gain, but more research is needed in this area; and

- Policy interventions need to be consistent over time and need guidance from the central government along with acknowledgement that educational change takes time, resource and support.

1. The General Education Development Tests (GED) -- a set of five tests that measure writing skills, social studies, science, interpretation of literature and the arts, and math -- is the most common alternative way to earn a high school credential. To pass the test, an adult must achieve a minimum total score and a minimum score on each of the five subject tests.

INTRODUCTION

Strategic work to improve adult literacy, language and numeracy (LLN) skills has been underway in New Zealand since 2001 with the release of '*More than Words: The New Zealand Adult Literacy Strategy*[2] by the Ministry of Education. The Ministry followed this with a programme of work 'Learning for Living'[3] that gave formal shape to LLN provision in New Zealand, with a particular focus on professionalising the workforce and developing the Learning Progressions[4]. However, in 2001 the recommendations on how to improve literacy for adult Māori in both te reo Māori and English, by the Māori Adult Literacy Working Party has not progressed[5].

The findings from the Adult Literacy and Lifeskills (ALL) Survey 2006 showed that around 43 percent of the New Zealand adult population have less than optimal literacy skills, and 51 percent have less than optimal numeracy skills. While there was a reduction in the proportion of adults with very low literacy skills since the 1996 International Adult Literacy Survey (IALS), New Zealand continues to have a large proportion of the population who are not well equipped to participate fully in society. This does not mean that these people cannot read but rather that the literacy demands in today's workplaces and wider society require people to have higher skill sets.

In 2007 the LLN work was transferred to the Tertiary Education Commission (TEC) who, with the Ministry, set the subsequent operational policy direction. This has been articulated in a number of documents, including:

• LITERACY, LANGUAGE AND NUMERACY ACTION PLAN 2008 – 2012: Raising the literacy, language and numeracy skills of the workforce[6];

• The New Zealand Skills Strategy[7];

• Getting Results in Literacy and Numeracy: Contributing to the vision that all New Zealanders enjoy a level of literacy and numeracy that enables them to participate fully in all aspects of life 2010 – 2013 ; and the

• Adult Literacy and Numeracy Strategy 2012[8].

Over the years, the TEC has taken a three-pronged approach to improving adult LLN skills. This approach has included building an instructional infrastructure (Learning Progressions, Literacy and Numeracy for Adults Assessment Tool, Pathways Awarua), providing learning opportunities, and introducing professional development for the workforce. The activity informed by this policy approach has been a comprehensive educational change project.

This annotated bibliography highlights the findings from research into adult LLN skills since 2006. The literature has been taken from New Zealand and countries that face similar LLN issues to New Zealand. These include the UK, Ireland, Canada, Australia and the USA. This body of literature has thus been drawn on to inform New Zealand's approach to date, and will continue to shape our thinking on these issues for the future. Particular attention has been paid to embedded

2. http://www.minedu.govt.nz/~/media/MinEdu/Files/EducationSectors/TertiaryEducation/AdultLiteracyStrategy.pdf
3. http://www.minedu.govt.nz/NZEducation/EducationPolicies/TertiaryEducation/PublicationsAndResources/Newsletters/LearningForLiving.aspx
4. The Learning Progressions provide a framework that shows what adult learners know and can do at successive points as they develop their expertise in literacy and numeracy.
5. www.beehive.govt.nz/Documents/Files/030908TeKawaiOraReport.doc
6. http://www.tec.govt.nz/Documents/Reports%20and%20other%20documents/literacy-language-numeracy-action-plan-17-september.pdf
7. http://skillsstrategy.govt.nz/
8. http://www.tec.govt.nz/Tertiary-Sector/Tertiary-Education-Strategy/Literacy-and-Numeracy-Implementation-Strategy/

approaches to delivering literacy and numeracy programmes.

The information can be used as a 'checkpoint' for New Zealand's work in literacy and numeracy, including policy development, research, and practice. The bibliography is set out in sections by LLN topics with summaries of key points of each of the research pieces.

Methodology

The literature considered in this bibliography includes books, evaluations, research, and journal articles written since 2006 in New Zealand, the UK, Ireland, Canada, Australia and the USA. It excludes research reports on the Adult Literacy and Lifeskills (ALL) Survey (2006)[9] as these provide an overview of literacy and numeracy skills in New Zealand rather than research evidence about the impact of policy interventions.

Research for this overview began with keyword searches on Google Scholar under the following terms: adult learning, literacy, numeracy, embedding, integrating, workplace learning, and assessment. All searches included the keywords and the Boolean term 'and' followed by the specific countries to be covered in the review. Once sourced, each piece of literature was keyword searched for information, and finally, the snowball method was used, whereby the reference lists of publications were checked for additional sources. The Ministry of Education library was also used for journal searches.

A possible limitation of this overview is that no check was made to assess the reliability of the sources. However, this limitation was mitigated by the number of studies included in the overview, which should ensure that the evidence gathered and conclusions drawn are sufficiently reliable.

Definitions

The definitions of key terms in this bibliography are in the table below.

Term	Definition
Embedded literacy and numeracy	Combining the development of literacy and numeracy with vocational and other skills. The literacy and numeracy skills developed provide learners with the competence, confidence and motivation necessary for them to succeed in the vocational programme, or at work and in life, (National Centre of Literacy and Numeracy for Adults)[10]. Embedding happens at the learner, programme and organisational level. A diagram showing the embedding process used by tutors is in the Appendix, or see info@alec.ac.nz
Literacy	[In the adult context] 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, (Tertiary Education Commission, 2009, p. 58).

9. These can be accessed on http://www.educationcounts. govt.nz/ [In the adult context] 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

10. http://www.literacyandnumeracyforadults.com/ resources/356158

Term	Definition
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, 2009, p. 59).
Language	The term Language was initially included in 'LLN' as a reference to English for Speakers of Other Languages (ESOL). This 'L' has to some extent been dropped, with any references to language proficiency included in the general term 'literacy'.
e-learning	This term refers to learning that is facilitated by electronic technologies. It includes the usage of computers and handheld data storage and transmittal devices including mobile phones. It is often used to facilitate distance learning, (Fletcher, Nicholas and Davis, 2010).
Digital literacy	Digital literacy comprises the technical ability to use, at basic level, a computer and the internet; understand and critically evaluate digital media; and create content and communications (Standing Council on Tertiary Education, Skills and Employment, 2012).
Financial literacy	Financial literacy is the ability to make informed judgements and effective decisions on the use and management of money. It covers everything from having financial knowledge to having the understanding, confidence and motivation to make financial judgements and decisions (Commission for Financial Literacy and Retirement Income, 2012).
Health literacy	Health literacy means the capacity to "obtain, process and understand basic health information and the services needed to make the appropriate health decisions," (Ministry of Health, 2010, p.iii).

Embedding literacy and numeracy

At the centre of the work to strengthen literacy and numeracy in adults and increase the number of learning opportunities has been the development of the embedded approach. This means integrating literacy and numeracy into programmes in an open and transparent way.

Guidance for embedding in New Zealand is given through the Theoretical Framework[11]. This framework provides the research-based understandings that can be used for making decisions about how to include and integrate literacy and numeracy into vocational training.

This section describes the findings from research and evaluation in relation to the practice of embedding LLN into vocational courses and programmes in tertiary education organisations and workplaces through industry training.

Casey, H., Cara, O., Eldred, J., Grief, S., Hodge, R., Ivanic, R., Jupp, T., Lopez, D., and McNeil, B. (2006) *"You wouldn't expect a maths teacher to teach plastering…": Embedding literacy, language and numeracy in post-16 vocational programmes – the impact on learning and achievement.* London: National Research and Development Centre.[12]

Keywords: adult learning, embedding, literacy, numeracy, further education

The research took place with around 200 learners in 15 Further Education Colleges and one large training provider in five regions in the UK. It looked at students whose primary aim was to achieve a vocational qualification. The key factors related to embedding that contributed to students' retention, achievement and attitudes included:

- teamwork between literacy, ESOL, numeracy teachers, and vocational teachers (note, in this work this sometimes meant literacy/numeracy specialists working in classrooms alongside vocational tutors) – where a single teacher was asked to take dual responsibility for teaching vocational skills and LLN, learners were less likely to succeed;

- staff understandings, values and beliefs – positive attitudes towards the learners and the subject matter makes a difference;

- aspects of teaching and learning that connect literacy, ESOL and numeracy to vocational content; and

- policies and organisational features at institutional level, such as support from senior management, means that resources can be directed into embedded programmes.

This was one of the few reports sourced for this bibliography that reported on outcomes for learners. Here the researchers found that:

- where LLN skills were embedded in courses, there were more positive outcomes than in courses in which these skills were treated separately; and

"Embedding does not mean smuggling LLN learning into the curriculum by stealth. Where it is viewed as something to be hidden, there is a danger that its importance will be overlooked by both teachers and learners, and that vital learning opportunities are lost."

(Carpentieri, 2007, p.51).

11. http://www.literacyandnumeracyforadults.com/resources/356028
12. http://nrdc.org.uk/publications_details.asp?ID=73#

Learning in workplaces attracts those who would not otherwise participate in learning, particularly men and ESOL learners.

- there was a positive impact on retention, achievement and success rates, particularly at level 2, and success rates were higher in embedded than in non-embedded courses.

Higher retention rates were attributed to two factors:

- embedding literacy, ESOL and numeracy skills in vocational programmes reduced the stigma associated with these areas; and

- teaching LLN within programmes enabled learners to cope more effectively with the content of the course.

This can be considered one of the seminal works on embedding literacy and numeracy. The findings of this research were used to inform much of the TEC's work to date on LLN. The findings of this research are also cited in other publications in this bibliography that attest to the impact of embedding.

Carpentieri, D (Ed). (2007). *Five years on research, development and changing practice.* London: National Research and Development Centre.[13]

Keywords: adult learning, literacy, numeracy, workplaces, teaching, embedding

This report synthesises findings from a wide range of research in the *Skills for Life* (SfL*)* programme in England. The highlights from the report, as relevant to the NZ context, include:

- learning in workplaces attracts those who would not otherwise participate in learning, particularly men and ESOL learners. Of those on programmes, many thought that they were able to do their jobs better, and 80 percent changed their attitude towards education and training

- workplace learning for apprentices suggested that there needs to be a mix of embedded and discrete LLN provision;

- there is a divide between ESOL and literacy teaching, but the research shows that teachers need to be confident in both areas;

- embedding numeracy into programmes better engages learners in this area as they are likely to have different motivations for literacy and ESOL than they have for numeracy;

- the importance of a qualified teaching workforce;

- the success of embedding in helping learners achieve literacy and numeracy qualifications and vocational qualifications;

- the need for a whole of organisation approach;

- the importance of making literacy and numeracy obvious in programmes;

- embedding responds to learners' needs and places them at the centre of all learning; and

13. http://nrdc.org.uk/publications_details.asp?ID=126#

- encouraging learners to practise their skills outside of learning time led to increases in knowledge, skills and motivation.

Coben, D., Brown, M., et al. (2007). *Effective teaching and learning: numeracy.* London: National Research and Development Centre.[14]

Keywords: numeracy, teaching, hours, further education

This study took place over two years and involved 412 learners and 34 teachers in 47 classes. Two-thirds of the classes were in further education colleges. Forty percent of the learners were aged between 16–19. In relation to the impact of the courses the study found that:

- learners improved their numeracy scores by an average nine percent although there was a range of average gains between classes;

- learners attitudes were more positive at the end of courses;

- average attendance by learners was 39 hours and many had made significant learning gain (although others needed more hours);

- there was no correlation between the number of hours of tuition and the gain in scores[15]. The researchers thought that this might have been accounted for as a result of the differences in the programmes;

- teachers' practice was quite 'traditional' with little use made of practical resources or ICT;

- teachers developed positive relationships with students; and

- teachers were, on the whole, qualified to teach mathematics or numeracy.

The findings in this study provide evidence that gain can be made in fewer hours of teaching. However, it also indicates that more needs to be known about what contributes to improved learning.

Thomas, G. & Ward, J. (2009). *Numeracy for adults. Latest finding from teaching and learning research.* Wellington: Ministry of Education.[16]

Keywords: adult learning, embedding, numeracy

This report, based on a literature review, covers a number of aspects related to teaching numeracy to adults. The report includes a discussion on the successful features of embedding numeracy. These features include:

- where tutors work as a team, learners are more likely to stay in training and complete vocational qualifications;

- successful approaches to embedding numeracy clearly link LLN and vocational components of the course;

- effective assessment in programmes makes use of learning progressions to provide direction for teaching programmes and to

Teachers' practice was quite 'traditional' with little use made of practical resources or ICT.

Where tutors work as a team, learners are more likely to stay in training and complete vocational qualifications.

14. http://nrdc.org.uk/publications_details.asp?ID=86#

15. Note, this was also found in a New Zealand study by the Department of Labour in relation to increases in reading score in workplace programmes, but is contrary to evidence in other studies.

16. http://www.educationcounts.govt.nz/publications/ tertiary_education/51931/4

monitor progress toward learning goals; and

• embedded numeracy provision is facilitated by appropriate organisational policies, management structures, resourcing, and working conditions.

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Leach, L., Zepke, N., Haworth, P., Isaacs, P. & Nepia, W. (2009). *Organisational factors that affect delivery of adult literacy, language and numeracy provision.* Wellington: Ministry of Education.[17]

Keywords: literacy, numeracy, embedding, tertiary education organisations, ESOL

This review of international literature looks at embedded LLN practices and the organisational factors that impact on this provision. It also looks at literature on the teaching of ESOL. In relation to embedding, the review found:

• there is no 'single, perfect' model of embedding;

• a whole of organisation approach is needed;

• LLN needs to be built into courses;

• close collaboration is needed between LLN specialists and vocational tutors; and

• professional development for staff is necessary.

In relation to ESOL provision, the review found:

• a need for ESOL and bi-literacy provision;

• significant differences between ESOL and literacy provision, which requires either separate provision or teachers who are trained in both;

• ESOL learners have diverse levels of literacy knowledge;

• ongoing need for professional development; and

• embedding could make LLN learning invisible to learners, but it is still beneficial in terms of being relevant and meaningful.

Leach, L., Zepke, N., Haworth, P. & Isaacs, P. (2010). *One size does not fit all: how five tertiary education organisations embed literacy, language and numeracy.* Wellington: Ministry of Education.[18]

Keywords: embedding, literacy, numeracy, tertiary education

This research was undertaken in five organisations: one wānanga, one Institute of Technology and Polytechnic (ITP), two Private Training Establishments (PTEs), and one Industry Training Organisation (ITO). The literature review summarised by Leach et al. above was used to compare the findings against. The key findings were:

17. https://akoaotearoa.ac.nz/download/ng/file/group-189/ organisational-factors-that-affect-delivery-of-adult- literacy-language-and-numeracy-provision---full- literature-review.pdf

18. http://www.educationcounts.govt.nz/publications/ tertiary_education/one-size-does-not-fit-all-how-five- tertiary-education-organisations-embed-literacy,- language-and-numeracy-summary-report/key-findings

- the need for an organisational champion to lead, motivate and energise;

- there were different philosophical approaches to literacy – i.e., functional literacy as part of a wider approach to critical and cultural literacy; human capital; social capital;

- the need for a whole of organisation approach – but there are different ways of doing this;

- the need for planning and policy documents to support the work;

- the need for a strong focus on learners, including a constructivist approach (learners involved in planning); personalised rather than individualised; learning in groups;

- literacy learning needs to be in an authentic context – for some learners this will be vocational, for others, this will be family or community-based; and

- the need for trained staff and the organisation to have a commitment to ongoing professional development of staff.

The primary observation of the research was that while the factors listed above were common to the organisations, the way in which they were implemented differed.

The two pieces of research by Leach et al. are useful in that they were conducted in the New Zealand context. The findings support the TEC's recently completed work on the embedded practices referred to below.

Industry Training Federation. (2010). *ITO literacy and numeracy project: Summary of good practices.* Wellington: Author.

Keywords: embedding, literacy, numeracy, industry training

This summary was written as part of a wider piece of action research on embedding literacy and numeracy into ITOs that took place in 2008 and 2009. The publication is written for ITOs and provides information in relation to the culture, planning, processes and capability required by ITOs in the areas of governance, management, leadership, standard setting, and managing arrangements for trainees. The end of the document provides a reflective tool that can be used by ITOs to inform their embedding work. It is a user friendly document that provides practical advice for ITOs on embedding.

Another piece of work that is useful for ITOs is the summary of case studies that can be found on http://www.itf.org.nz/skills-and-productivity/literacy-and-numeracy/ito-good-practice-project/case-studies-and-good-stories/

Office for Standards in Education. (2011). *Tackling the challenge of low numeracy skills in young people and adults: Report summary.* Author.[19]

The need for trained staff and the organisation to have a commitment to ongoing professional development of staff.

19. http://moodle.unitec.ac.nz/pluginfile.php/115773/mod_resource/content/0/Summary_-_Tackling_the_challenge_of_low_numeracy_skills_in_young_people_and_adults.pdf

Keywords: numeracy, vocational training, embedding,

This report provides evidence from Ofsted inspectors' evaluations of 59 providers of numeracy programmes. The evidence shows that:

- the most effective provision occurred where it was delivered within vocational programmes rather than as a separate option;

- greater success was found in programmes where a numeracy specialist supported the vocational teacher to plan and deliver sessions;

- where numeracy was integrated into vocational programmes, learners made good progress in developing the technical numeracy skills required for their vocational qualification and related employment;

- learners in successful programmes said that they saw how numeracy related to their jobs and everyday lives and were motivated to put the effort into something they had previously avoided; and

- youth and adults are not aware that numeracy is a precondition for achieving qualifications and jobs and improving personal lives, so more needs to be done to raise this awareness.

Ryan, R., McDonald, H., Sutton, A. & Doyle, S. (2012). *Formative evaluation of ITO embedded literacy and numeracy projects*. Wellington: Department of Labour.[20]

Keywords: embedding, literacy, numeracy, industry training

This formative evaluation looked at the implementation of pilot projects to embed literacy and numeracy in Industry Training Organisations (ITOs). The evaluation took place over two years from 2009–2011 and included analysis of ITO reports to the TEC, key informant interviews with 23 ITOs, and three case studies. The evaluation shows that ITOs undertook the following activities in relation to embedding:

- strategy development;

- awareness raising with employers;

- profiling the LLN demands of jobs linked to qualifications;

- building internal capability;

- assessment and diagnosis of learners needs (most ITOs developed their own assessment tool for this);

- embedding in off-job training, including the provision of professional development for tutors;

- embedding in on-job training, which proved challenging and sometimes slow; and

- improving resources, including their design, and the inclusion of

> **Youth and adults are not aware that numeracy is a precondition for achieving qualifications and jobs and improving personal lives, so more needs to be done to raise this awareness.**

specific literacy and numeracy activities.

Where embedding was found to be the most successful, the key factors were:

- improving participants' knowledge of the principles of adult education and learning;

- rapid identification of trainees likely to experience literacy and numeracy difficulties; and

- a better alignment of the literacy and numeracy demands of training with those of the job. (p. xiii).

The overall finding was that while ITOs had completed projects funded by the TEC, they still had considerable work to do before they would be able to say that literacy and numeracy was fully embedded into training. The issue with the pilots was that at their inception, the ITOs were encouraged to be experimental, and there was little guidance on how to implement embedding as a practice. Formal guidance from the TEC on embedding for ITOs did not come until two years into the project, when the embedded guidelines for ITOs were produced.

This evaluation provides a useful insight into the challenges of implementing policy without sufficient guidance and direction from policy funders. However, it does show the benefits of embedding in terms of improving the overall approach to training for ITO trainees.

Hazlewood, K. and Alkema, A. (2013). *Literacy and numeracy professional development: Research findings.* Wellington: Tertiary Education Commission.[21]

Keywords: literacy, numeracy, embedding, professional development, tertiary education

The purpose of this research was to gain an understanding of the extent to which Tertiary Education Institutes (TEIs) were embedding LLN at the organisational, programme and learner level. It also looked at how professional development delivered by the National Centre of Literacy and Numeracy for Adults (the National Centre) was supporting these TEIs to improve their LLN practice. Evidence was gathered through interviews with 20 education providers. The key findings of the research were:

- there was a continuum of practice related to embedding, with the ITPs showing more mature practice than the PTEs in that they were embedding across their organisations, had qualified staff, and were capable of showing leadership in the field;

- those with more mature practices were more likely to have sourced PD from the National Centre and valued the learning that the National Centre had provided;

- all organisations found aspects of embedding challenging,

A better alignment of the literacy and numeracy demands of training with those of the job. (p. xiii)

21. http://www.tec.govt.nz/Documents/Reports%20 and%20other%20documents/Literacy-and-Numeracy-Development-Findings-2013.pdf

All organisations found aspects of embedding challenging, including developing a whole of organisational approach, high staff turn-over, and embedding literacy and numeracy in programmes for distance learners.

including developing a whole of organisational approach, high staff turn-over, and embedding literacy and numeracy in programmes for distance learners;

- in relation to professional development, those interviewed wanted professional development to be practical rather than theoretical and academic, and while they would prefer face-to-face interaction, realised because of cost constraints that a blended approach would work for them; and

- given the continuum of practice, it was recommended that the National Centre provide more targeted professional development, especially for PTEs who have done little more than start to use the Assessment Tool with learners, as it is a funding requirement.

These research findings were used to inform the development of the TEC's Embedded Literacy and Numeracy (ELN) Practices[22] table that describes embedded practices at three levels. This will be a useful tool for organisations to use as they reflect on and judge their progress on embedding.

Summary comment

The literature is clear that embedding works in that the embedded approach is more likely than other approaches to engage and retain learners. In the New Zealand context it has been challenging for organisations to develop whole-of-organisation approaches, upskill staff, rethink ways of teaching, and adapt teaching materials. As the findings from the most recent work cited above (in ITOs and TEIs) show, there is still a way to go before the embedded approach is fully integrated into all organisations.

Overall there is limited evidence to date about embedding as a whole-of-organisation approach in tertiary education organisations. It would be worthwhile for the TEC to repeat the research interviews, conducted by Hazlewood and Alkema (2013), at the end of 2014 to ascertain the extent to which there has been further organisational change, particularly in the PTEs.

22. http://www.tec.govt.nz/Resource-Centre/Software-tools/Literacy-and-Numeracy-for-Adults-Assessment-Tool/

Workplace learning

Marr, B. & Hagston, J. (2007). *Thinking beyond numbers: Learning numeracy for the future workplace.* Adelaide: National Centre for Vocational Education Research.[23]

Keywords: adult learning, workplace learning, numeracy

This Australian study looks at the place of numeracy teaching in the workplace, and the type of numeracy that is required by workers. Evidence was gathered through a literature review, interviews with industry representatives, and case studies in three work sites. The research found that:

- workers often use a range of numeracy skills in their work and do not recognise them as such;

- numeracy was still associated in employers' minds with 'primary school arithmetic';

- in automated workplaces, workers need the skills to make judgements about accuracy, such as, having 'a feel for numbers' that allows for approximation and estimation;

- numeracy is important for occupational health and safety;

- knowing how to store and retrieve data is becoming increasingly important;

- workers wanted training that was informal and delivered by peers and supervisors rather than anything that reminded them of school;

- industry representatives thought that on- and off-job training was important as it allowed time for practice and reflection;

- numeracy training needs to be framed positively, rather than as a deficit;

- numeracy skills need to be made explicit in training; and

- input into training programmes is required from both numeracy and industry experts.

This research reinforces the UK work on embedding, and is important for thinking about how to frame conversations with employers, as it outlines the role of numeracy in the modern workplace.

Department of Labour (2010). *Upskilling partnership programme: Evaluation report.* Wellington: Author.

Keywords: literacy, numeracy, workplace learning

The evidence for this evaluation of workplace literacy programmes, conducted in 2007–2009, came from 18 programmes in 15 different workplaces across New Zealand. The evidence in this report has also generated a number of articles[24] that have not been included in this bibliography. Nor has the report by Gray and Sutton[25] as the evidence gathered for this report predates the Upskilling work. The key findings

Workers often use a range of numeracy skills in their work and do not recognise them as such.

Workers wanted training that was informal and delivered by peers and supervisors rather than anything that reminded them of school.

23. http://www.ncver.edu.au/publications/1805.html

24. http://www.dol.govt.nz/publications/research/ upskilling-evaluation/upskilling-evaluation.pdf. Note, there are also four articles, Benseman, J. (2010). Transferring literacy skills in the workplace. *Reflect, 13(Summer)*, 9–11; Benseman, J. (2010). Planning and teaching effective workplace literacy, language and numeracy programmes: what does research tell us? *Journal of Adult Learning Aotearoa New Zealand* 38(2), 19–28; Benseman, J. (2012). Literacy and workplace change: evaluation findings from 18 workplace literacy programs. *Journal of Research and Practice in Adult Literacy, Secondary, and Basic Education,* September 2012; Benseman, J. (2013). Recruiting and retaining learners in workplace literacy programmes in New Zealand. Australian Journal of Adult Learning, 53(1), 7–25. They have not been included in the bibliography as they contain the same material.

25. Gray, A. & Sutton, A. (2007, August). The workplace literacy Fund: A report prepared for the Department of Labour. http://www.dol.govt.nz/PDFs/workplace-literacy-fund-august-2007.pdf;

Programmes attract those who do not usually attend learning programmes, including those with low LLN skills, low qualifications, men, Māori and Pasifika.

from the evaluation were that:

- programmes attract those who do not usually attend learning programmes, including those with low LLN skills, low qualifications, men, Māori and Pasifika;

- learners attended, on average, 35 hours of learning and there were small to medium statistically significant gains in their reading and writing scores. However, as there was no correlation between the hours they attended tuition and gain, the writers of the report concluded that there was no conclusive evidence that scores had improved;

- most participants thought that their literacy skills had improved, but there was no connection between self-reported improvement and actual scores;

- workplace practices improved, but there was no connection between improvements in literacy scores and workplace practices;

- supervisors reported that around 60 percent of the learners had improved in workplace practices such as teamwork, attitude, initiative, ability to work unsupervised, willingness to try new tasks, and completion of paper work;

- the contribution of LLN to improving productivity happens in small ways; and

- 15 of the 18 programmes continued work in some form after the initial programmes had been completed.

This report provides some evidence that programmes of up to 40 hours can make a difference for some workers. It also highlights that practices can change without learners necessarily making a proficiency gain in reading and writing scores.

Sligo, F., Tilley, E., Murray, N., Watson, B., Comrie, M. & Vaccarino, F. (2010). *Modern apprentices literacy learning: A formative evaluation.* Wellington: Department of Labour.[26]

Keywords: literacy, workplace learning, apprentices

The evidence for this evaluation came from a literature review, data on almost 200 apprentices who were receiving additional literacy and numeracy support to help them complete apprenticeships, and case studies in 14 workplaces. The evaluation concluded that there were better outcomes for the apprentices when:

- there was a three-way collaboration between the literacy tutor, the modern apprenticeship coordinator and the employer. Together they provided a network of support for the apprentice;

- there was one-to-one tutoring in a non-classroom approach; and

- the literacy tuition was relevant to the context of the vocational learning.

26. http://www.dol.govt.nz/publications/research/modern-apprentices/modern-apprentices.pdf

In addition to these factors was the need for the workplace to have a culture of learning including being positive about literacy learning. There needs to be supportive employers who understand the role of literacy in the workplace and the potential it has to contribute to productivity, and who provide time for apprentices to do some of their bookwork on the job.

Heathrose Research. (2011). *An evaluation of the learning representatives programme*. Wellington: Ako Aotearoa.[27]

Keywords: literacy, numeracy, workplaces, union learning

This report discusses the findings from the evaluation of the TEC-funded Learning Representatives programme delivered by the New Zealand Council of Trade Unions (NZCTU). Evidence was gathered from documentation and case studies in seven workplaces. The findings show that:

- the support of managers and employers was highly valued by the learners;

- there were changes in workers' attitudes to learning, particularly those who had previously had a negative attitude and were encouraged back into learning;

- there was reported evidence LLN gain and evidence of faster completion of qualifications (although a number of factors may have contributed to this);

- it took time for the Learning Reps to get up to speed with their roles; and

- there was an expectation that employers would come on board and support the work, but this was not always the case in spite of the NZCTU putting considerable resource into this.

Information in this report could be useful for informing future work around peer support or mentoring in the workplace that supports low skilled workers to enrol and maintain their participation in training programmes.

Australian Industry Group. (2012). *When words fail: National workforce literacy project final project report.* Author.[28]

Keywords: literacy, numeracy, workplace programmes, return on investment

This report sets out the findings of the National Workplace Literacy Project that started in 2009. It includes evidence gathered through consultation with employers, workplace trials and evaluation of these trial sites. The main findings include:

- 75 percent of employers reported that their businesses were affected by low levels of LLN;

- employers thought that addressing the issue of low LLN skills needs to be shared between government, individuals, education

The support of managers and employers was highly valued by the learners.

27. http://learningreps.org.nz/files/Evaluation%20of%20the%20Learning%20Representatives%20Programme.pdf

28. http://www.aigroup.com.au/portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/LIVE_CONTENT/Publications/Reports/2012/10870_national_workforce_literacy_project_final_report_web.pdf

Return on investment provided a focus for employers and enabled them to give consideration to developing indicators related to productivity, quality, compliance, safety, and human resources.

authorities and employers;

- employers do not have the capacity to address the issue (but a survey undertaken as part of the study indicated that it is possible to shift employers' perception about this);

- there needs to be a diversity of training approaches;

- return on investment provided a focus for employers and enabled them to give consideration to developing indicators related to productivity, quality, compliance, safety, and human resources;

- employers were interested in return on investment measures, but there was no return on investment tool available to measure such a return;

- measuring LLN proficiency gain on its own is not enough – consideration also needs to be given to other measures of success such as improvements in confidence, teamwork and employee initiative and problem solving;

- the involvement of managers was critical, along with the need to work with and train supervisors and leading hands;

- the need for an increased awareness of the issues and the LLN demands in workplace documentation and communication; and

- an increased commitment from employers to budget for further training and apply for further funding assistance.

As a result of this report, the Australian Council of Educational Research (ACER) is developing Return on Investment instruments to document the productivity benefits arising from employer provision of LLN training for employees, and the costs involved in such training. The instruments will be available mid 2014[29].

Evans, K., Waite, E. & Kersh, N. (2012). The challenge of establishing sustainable workplace 'Skills for Life' provision in the UK: organizational 'strategies' and individual 'tactics'. *Journal of Education and Work.* DOI:10.1080/13639080.2012.742180

Keywords: literacy, workplace programmes, sustainability

This paper takes evidence from two substantial bodies of work that looked at the impact of the Skills for Life (SfL) programmes in workplaces in the England.

- Project One: Adult Basic Skills and Workplace Learning project: a five-year study (2003–2008) of the impact of workplace 'Skills for Life' provision on organisations and employees (564 learners in 53 organisations from a variety of sectors); and

- Project Two: LLAKES Strand 3 (2009–2011): key factors that facilitate and inhibit sustainable workplace SfL provision, spatial dimensions of SfL workplace provision, learner biographies/transitions.

29. http://www.acer.edu.au/vawe/vawe-news/return-on-investment-in-language-literacy-and-numeracy-training

The paper discusses the idea that learning at work is not a priority for employers who are more like to be concerned with the market and competition, followed by work organisation and job design. In relation to the SfL programmes the paper reports that:

- learners engaged in workplace literacy programmes for a range of reasons in addition to improving the skills for their current job including: making up for previous lost opportunities in education; future career aims; helping their children and self-improvement;

- learners achieved an increase in confidence; increased their willingness to engage in further learning; and were more able to help their children with their homework;

- it is difficult to sustain provision where there is lack of management continuity and lack of organisational support at top management and line management level;

- it has been difficult to sustain programmes during the economic downturn;

- the organisations have taken a broad approach to learning rather than promoting it as addressing LLN deficiencies, or just addressing workplace needs; and

- sustainable programmes require flexibility on the part of the employer and the provider.

Yasukawa, K., Brown, T. & Black. S. (2012). Workplace literacy and numeracy learning: An opportunity for trade union renewal in Australia? *International Journal of Training Research.* 10(2): 94–104.

Keywords: Workplace literacy and numeracy; social practices; trade union renewal; vocational education and training

This article used evidence from literature and two small case studies to inform the authors' views on workplace literacy and numeracy programmes. The authors argue for a role for unions to support learning in the workplaces for the following reasons:

- programmes are usually employer-driven with a narrow focus on developing functional skills for the workplace (human capital approach) rather than social capital for learners;

- the 'bottom-up approach' used by peers means that workers are more likely to be honest about their needs; and

- promoting education and training can make unions more relevant in the workplace

- workers and unions have the opportunity to shape workplace learning to meet their needs along with those of the employers.

The 'bottom-up approach' used by peers means that workers are more likely to be honest about their needs.

Summary comment

While workplace programmes attract learners who might not otherwise engage in LLN learning, there is limited evidence about proficiency gain (possibly due to short duration of these programmes). Rather, there is reported evidence of changes in LLN practices and workplace practices.

Impact of policy investment

Vorhaus, J., Litster, J., Frearson, M. & Johnson, S. (2011). *Review of research and evaluation on improving adult literacy and numeracy skills*. London: Department of Business, Innovation and Skills.

Keywords: adult literacy, numeracy, outcomes

This literature review looked at 10 years of research related to adult literacy and numeracy in relation to the following topics: the economic, personal and social returns to learning; the quality and effectiveness of provision; the number of learning hours needed for skills gain; learner persistence; the retention and loss of skills over time; and the literacy and numeracy skills that are needed.

This was one of the most substantial pieces of research found in the review. There was strong evidence of:

• benefits of embedding LLN in vocational programmes, including a higher likelihood of retention and completion;

• the positive impact on learners of working with qualified teachers – the more qualified the teacher the greater the learner progress;

• positive personal and social returns on improving LLN skills; and

• the need for multiple ways of engaging in learning – in class, self-study, distance learning, ICT supported learning.

There was growing evidence that improving LLN skills has a positive effect on earning and employment. There was limited evidence about the ability of short programmes in workplaces and their ability to increase literacy skills in the short term. However, workers who use their skills at work and in everyday life continue to improve their skills and are more likely to continue with further education and training.

The review also found promising evidence in relation to:

• blended learning – combining face-to-face and technology-based, formal and self-study methods;

• the significance of techno-mathematical literacies – a combination of ICT, literacy and numeracy skills; and

• the time required to make significant learning progress – often in excess of 100 hours[30.] (p.11).

• There was little evidence found on:

• the impact of LLN on productivity; and

• the cost effectiveness of LLN programmes.

Reder, S. & Bynner, J. (Eds). 2009. *Tracking adult literacy and numeracy skills: Findings from longitudinal research*. New York: Routledge.

> *However, workers who use their skills at work and in everyday life continue to improve their skills and are more likely to continue with further education and training.*

30. The report states that, "Better gains for learners seem to be associated with courses that allow for levels of participation in excess of 100 hours; learners require more time to make educationally significant progress than they generally spend in provision. For those who only need to 'brush up' existing skills, short courses are often adequate for learner gains; in contrast, learners working at a higher level may find it more difficult to achieve a qualification within the learning hours allocated to a single-year course. There is some limited evidence to show that learners who engage in self-study between classes make better progress," (p. 11).

LLN competencies continue to develop after people leave school.

This book includes chapters by researchers in the UK and the US on the findings of longitudinal research into the outcomes for adults in adult LLN programmes. Given the methodological rigour of the studies these findings can be considered robust. The key points of interest include:

From Bynner and Parsons

- LLN competencies continue to develop after people leave school;

- There are short-term proficiency gains in LLN and changes in LLN practices; in the short-term there is a correlation between levels of proficiency and levels of engagement with practices;

- Over time, participation in LLN programmes does not affect the development of proficiency[31,] but it does affect engagement in practices; and

- Measures of practices rather than proficiency may be a better way to assess programme impact.

From Alamprese

- Adults with low-level skills make progress in decoding before increasing their skills in other reading components, so the use of general literacy tools may not be adequate for measuring the gains of these learners;

- Pre-test scores are the biggest predictor of learner gain;

- Pre-programme assessment is essential for placing learners in the right programmes; and

- Pre- and post-test measures are important for reporting learner gain accurately.

- From Condelli, Wrigley, Yoon (on ESOL learners)

- Comprehension levels changed little, but oral language scores improved considerably

- Younger learners made more progress than older learners as did those with higher qualifications, although this advantage faded over time;

- Learning in real world contexts had a positive effect on growth of reading skills;

- Students who attended class more regularly made greater gain; and

- The use of learners' native language to give directions or clarify concepts improved the rate at which comprehension grew.

From Comings

- From a number of studies, the conclusion is that 100 hours of

31. Note, proficiency change is related to a person's age. Proficiency reduces with age.

instruction or more over a year is the point at which the majority of adult learners are likely to show measurable progress [note, 'measurable progress' relates to improving one grade level, or in the US pass the General Education Development (GED)].

From Vorhaus, Howard, Brooks, Bathmaker, Appleby

- In SfL programmes, there were small gains in numeracy and reading for both literacy and ESOL learners, and writing for ESOL learners, but not literacy learners

- Provision worked equally well for all groups of learners.

From Metcalf and Meadows

- The study looked at the impact of attending SfL programmes rather than the connection between the LLN skills gained and wider social and economic outcomes. Findings were that:

- Learners felt more confident

- It took three years for employment benefits to emerge

- There was no increase in earnings, although some learners had increased the scope of work they were able to undertake

- Learners were more likely than the comparison group to think that their LLN skills had improved

- Those with learning disabilities or dyslexia made slower progress

- Learners were more committed than the comparison group to further education and training (the authors note that this is an important finding as it "provides evidence to support the hypothesis that the main value of improving literacy and numeracy skills for adults is that it opens the way to further learning opportunities, some of which might help to develop skills which are directly relevant to work" (p.239)

- The authors' final point is that: "Literacy and numeracy alone rarely deliver the skills needed for the workplace, but without literacy and numeracy skills people are unable to do the kind of mainstream education and training courses which do enhance employability" (p. 240).

From Evans, Waite, Admasachew (Workplace)

- Workers attend programmes for personal and work reasons, most of them had very little post-school learning;

- Learning in the workplace is accessible, familiar and convenient for workers;

- 40 percent of workers reported changes in the way they did their jobs;

- Workers' confidence inside and outside of work improved; and

- Workers had an improved attitude towards learning.

*Literacy and numeracy alone rarely deliver the skills needed for the workplace, but without literacy and numeracy skills people are unable to do the kind of mainstream education and training courses which do enhance employability.
(p. 240).*

Using practice measures would "broaden and enrich" policy makers' and funders' perspectives and adult literacy and numeracy development, and have the potential to improve programmes.

From Rose

- 40 percent of students needed over 80 hours of instruction before they could pass their GED.

This is a very useful reference on the impact of literacy and numeracy programmes and collectively provides evidence for a rationale for LLN programmes in tertiary and workplace settings. It also highlights the complexity of longitudinal studies in terms of tracking participants and developing reliable tools that are able measure change over time.

Reder, S. (2009). Scaling Up and Moving In: Connecting social practices views to policies and programs in adult education. *Literacy and numeracy studies.* Vol 16/17. Issue 2/1. Pp35–50.

Keywords: literacy, numeracy, proficiency, practices

Evidence for this article is taken from a longitudinal study of 940 adults who did not complete school qualifications in Portland Oregon. Participants were interviewed six times over the eight year period 1998–2006. This is seminal study in that it gathers data over a reasonable time period and the data has been subjected to rigorous analysis. The key points of interest in this article relate to the rationale for measuring literacy practices as well as proficiency and include:

- the need for funders to collect proficiency data to justify the investment;

- adults' proficiency growth varies over their lifespan depending on personal and economic circumstances, for example, gaining employment and increased earnings are associated with increased proficiency;

- there was not a clear relationships between proficiency and participation in adult basic skills programmes;

- there was a strong relationship between programme participation and higher levels of engagement in practices, from which Reder concludes that programmes influence practices;

- more frequent reading and writing over time leads to greater literacy proficiency, but the same was not seen for numeracy;

- the more proficient learners are in numeracy to begin with, the more likely they are to engage in numeracy practices;

- using practice measures would "broaden and enrich" policy makers' and funders' perspectives and adult literacy and numeracy development, and have the potential to improve programmes;

- programmes that use authentic materials have higher levels of engagement in literacy practices and this is maintained by learners after they leave programmes – there is thus a causal chain as programmes lead to engagement in practices, which subsequently leads to increased proficiency; and

- the need to develop practice-based measures of programmes

that are not "narrow and reductionist" and are measures that are important for adults, policy makers and funders.

There is useful information in this study for informing the development of a literacy practices tool. The information might also be useful for informing discussions around expectations of literacy gain and proficiency, along with connections that need to be made between programmes, proficiency, and practices.

Dorgan, J. (2009) *Adult Literacy Policy: A Review for the National Adult Literacy Agency.* Dublin: National Adult Literacy Agency.[32]

Keywords: policy, literacy, numeracy, gain, embedding

This report summarises and discusses research on adult literacy policies and initiatives in Australia, Canada, Finland, New Zealand, Scotland, Sweden, the United Kingdom (England), and the USA. Its purpose was to inform LLN policy in Ireland. The key points made in the report include:

- countries that have not maintained policy momentum have stagnated, for example, Australia and Canada, although the latter has undertaken short term initiatives;

- short workplace courses do not lead to significant gains in literacy, although they do improve workers' confidence and social skills. The most successful courses are those that have tuition of 100 hours or more;

- there is limited evidence in relation to short-term employment or earning gains, but LLN learning does lead to improved employability skills, improved health, increased social capital and greater civic engagement;

- there is value in embedding (note, the evidence for this comes from research already cited in this bibliography); and

- change takes time, and there is need for ongoing research and evaluation to inform policy.

National Research and Development Centre. (2011). *A Literature Review of International Adult Literacy Policies.* Dublin: National Adult Literacy Agency.[33]

Keywords: literacy, numeracy, embedding, workplace learning, international policies

This research was undertaken by the NRDC for NALA in order to find out what could be useful to inform Irish literacy and numeracy policy[34]. It reviewed the policies of Australia, Canada, Finland, New Zealand, Scotland, Sweden, United Kingdom, and the USA. It is a substantive piece and the full report is a 'go-to' piece for information about LLN policies. It includes material similar to Dorgan's work cited above.

Short workplace courses do not lead to significant gains in literacy, although they do improve workers' confidence and social skills. The most successful courses are those that have tuition of 100 hours or more.

32. http://www.nala.ie/publications/adult-literacy-policy-review-national-adult-literacy-agency

33. http://www.nala.ie/sites/default/files/publications/A%20Literature%20Review%20of%20International%20Adult%20Literacy%20Policies%20110311_1.pdf

34. Note, this is very similar to the Dorgan piece cited above.

Family literacy programmes are important for the development of parents' human and social capital and for engaging parents in their children's learning.

The key points made in the research include:

- countries that have not maintained policy and programme momentum have stagnated, for example, Australia[35] and Canada. Canada is of particular interest as it has a strong research programme, which has not been followed by strong policy and a work programme;

- courses of short duration in workplaces and other settings lead to increased confidence and social engagement, but there was little quantifiable evidence of literacy gain (note, this research also cites the USA research, which finds that 100 hours of teaching are the most successful in producing gain);

- there was limited evidence either for or against LLN programmes producing meaningful employment of increases in earnings;

- there was clear evidence that programmes did lead to "improved employability skills, improved health, increased social capital and greater civic engagement" (p. 5);

- countries have taken different approaches, those that take the human capital approach with an emphasis on economic gains and those that take a social capital with an emphasis on social, health and citizenship benefits;

- the success of the embedded approach in the UK;

- the work from the US showed it takes time to implement policies see outcomes and refine them;

- the need to prioritise quality over quantity of provision; and

- family literacy programmes are important for the development of parents' human and social capital and for engaging parents in their children's learning.

While these are the key findings the researchers also commented on the challenges of their work because of the type, availability and quality of the research and evaluation available for the review. These challenges included:

- lack of detailed information of descriptions of implementation procedures (note, while these may exist they were not able to locate them through search procedures);

- research that was along theoretical lines rather than focusing on what happens during implementation;

- where there were descriptions of implementation these tended to be in evaluation reports of varying quality;

- there needs to be more quality research on blended and distance learning, and what and how LLN programmes and their various components work or do not work;

- the lack of evidence does not suggest evidence of failure, rather the lack of research; and

35. Note, since this research was undertaken Australia has developed a National Foundation Skills Strategy for Adults, (2012), http://www.scotese.natese.gov.au, which has the aspirational target that by 2022 two thirds of working age Australians will have literacy and numeracy skills at Level 3 or above as measured through the Program for International Assessment of Adult Competencies (PIAAC) Survey. This survey follows the 2006 ALL survey and is being administered for the first time in Australia in 2011–12. The results from the survey will form the baseline for measuring the success of the strategy by 2022.

- the short-term nature of research – it takes several years to fully realise the impact of LLN programmes on individuals earning and employment rates. While short-term impact is worth measuring, so too does the impact of programmes need to be looked at over the working lives of participants.

New Zealand's approach is reviewed favourably in the report as being "one of the most active in the world" (p. 35) in relation to the development of literacy and numeracy policies (note, this point was made when the LLN work was part of the wide Skills Strategy). It is useful for affirming the work that has been undertaken in the New Zealand context, and because New Zealand comes across positively in the international context. However, it also highlights that further work needs to be done in order to understand more about LLN policy and practice.

Alkema, A. & Heathrose Research. (2011). *Intensive literacy and numeracy fund stocktake report.* Unpublished report. Tertiary Education Commission.

Keywords: literacy, numeracy, hours of learning, outcomes

This research investigated the extent to which the new policy settings for the Intensive Literacy and Numeracy (ILN) Fund were working in terms of reaching learners with high LLN needs and the outcomes for them of 100 hours of learning. Evidence was gathered through 44 providers' reports to the TEC from 2010, interviews with 27 providers and 10 community stakeholders, and analysis of Assessment Tool data. The key findings in the report include:

- ESOL learners, Māori learners, Pasifika learners, those seeking to pass pre-employment tests and recent school leavers are the most common learners targeted for recruitment into ILN programmes;

- retaining learners is challenging as there are barriers to their continued participation and retention;

- providers reported that on entry to the ILN programme the learners have low reading, writing and numeracy skills (Starting Points to Steps 1–3 of the Learning Progressions) and make progress of some kind, either within a Step or by one Step of the Learning Progressions, although providers noted that it was difficult for those at the very low level, including ESOL learners to make progress in 100 hours; and

- where the Assessment Tool was used[36] it showed average entry level for numeracy at Steps 3/4 and for literacy, Step 2. Progress assessments for the small number who had them showed there had been gain for many learners.

Seventeen of the 26 providers thought that 100 hours was not enough time for all of their learners to make sufficient or sustainable progress. Eight providers were comfortable with the 100 hours for

New Zealand's approach is reviewed favourably in the report as being "one of the most active in the world" (p. 35) in relation to the development of literacy and numeracy policies.

36. The stock-take used data from 2010 when the Assessment Tool was not compulsory.

Perhaps the most important point to note is the time it takes for proficiency gain and that shorter-term programmes are more likely to impact on practices, which in turn, over time, improves proficiency.

some or all of their learners although these providers did not have ESOL learners as their primary target group.

EU High Level Group of Experts on Literacy. (2012). *Final report.*[37]

Keywords: literacy, numeracy, adult education

This report covers the findings from the policies of a number of European countries. It concludes that in order to improve LLN for adults the following needs to happen:

- courses need to be of high quality and based on individual learning needs. Learners prefer small classes and when motivated are more likely to persist;
- learners need to be taught by committed and well-qualified teachers;
- learning needs to be in real-life contexts and embedding has improved qualification rates in vocational training
- courses must be of the right intensity and duration (note, this report also cites the 100 hours required for progress from the US work.);
- longitudinal studies are required in order to assess the full impact of programmes;
- literacy needs to be promoted in workplaces to get to 'hard-to-reach' learners;
- learners can be attracted to study through the workplace and free programmes; and
- ICT programmes have the potential to attract older workers who have low LLN skills and this has the double benefit of improving digital literacy and LLN.

Summary comment

Collectively this research provides evidence that there are benefits to individuals who undertake LLN learning. Perhaps the most important point to note is the time it takes for proficiency gain and that shorter-term programmes are more likely to impact on practices, which in turn, over time, improves proficiency.

Assessment Tool

Introduced to the sector in 2010, the Literacy and Numeracy for Adult Assessment Tool (the Tool) has been a funding requirement for level 1–3 courses since 2011. Given the recentness of the introduction of the Assessment Tool, there is little research evidence about its use and impact. The three works cited here provide some early evidence about its use and the proficiency gain it is showing.

Haggland, J. & Earle, D. (2013). *Engagement is key.* Wellington: Ministry of Education.[38]

37. http://ec.europa.eu/education/literacy/what-eu/high-level-group/documents/literacy-report.pdf

38. http://www.educationcounts.govt.nz/publications/numeracy/engagement-is-key

Keywords: adult learning, literacy, numeracy, assessment

This was a small qualitative study that included a survey of 35 tertiary education providers who deliver programmes funded through Youth Guarantee. The survey was followed up with interviews with nine of the providers. The key findings from the research include:

- the need for the Tool to be seen as part of the wider organisational literacy and numeracy programme;

- that it is about more than just setting learners up to 'take the test';

- educators need to be able to understand assessment for learning and be able to use information for diagnostic purposes;

- learners need to be engaged in the learning process and understand why the assessment matters;

- organisations need to have the resources to support educators to use the Tool;

- it was a struggle to engage the learners in the process, especially a progress assessment; and

- learners did not find the items particularly engaging in that they did not relate to their real life experiences.

The findings from this report support anecdotal evidence that the TEC has been hearing since the implementation of the Tool. The evidence here has supported the development of a bank of items designed especially for youth.

Lane, C. (2013). *Assessing skills of adult learners in 2011*. Wellington: Ministry of Education.[39]

Key words: literacy, numeracy, assessment

This research reviews the data gathered from the Tool in 2011. It analyses data from 77,000 learners who undertook over 200,000 individual assessments. The key findings from the research include:

- the majority of assessments are in reading and numeracy;

- there were learners assessed at each qualification level, but the majority of them were in levels 1–4;

- learners in Youth Guarantee programmes were the most assessed group;

  - the rate of assessment of learners in Student Achievement Component (SAC)[40] and Youth Guarantee funded programmes was higher in ITPs (36 percent) than in PTEs (20 percent) and wānanga (15 percent);

  - learners were assessed lower in reading than in numeracy[41], "with approximately half of learners assessed for reading scoring in the top three steps (Learning Progressions Steps 4, 5 and 6), while for general numeracy approximately half of learners scored in the

The need for the Tool to be seen as part of the wider organisational literacy and numeracy programme.

That it is about more than just setting learners up to 'take the test.

Organisations need to have the resources to support educators to use the Tool.

39. http://www.educationcounts.govt.nz/publications/numeracy/assessing-skills-of-adult-learners-2011

40. The SAC is the Government's contribution to the direct costs of teaching, learning, and other costs driven by learner numbers.

41. Note, this is caused by the differences in the Steps in the Learning Progressions rather than in the learners' skills in reading and numeracy.

More than half of those who scored at Step 1 in their first assessment showed statistically significant gain.

Information from this research is useful for framing discussions around proficiency gain and for showing that more needs to be known about what to expect in relation to proficiency gain over time as measured against the Learning Progressions.

top two steps (Steps 5 and 6)";

- while the learners were not representative of the population, their patterns of achievement are the same as the adult population in the ALL Survey 2006;

- more than half of those who scored at Step 1 in their first assessment showed statistically significant gain; and

- those who scored highest on their first assessment showed the lowest rates of statistically significant gain.

The information in this report provides some useful insights into Assessment Tool use in the first year of implementation. It can sit alongside the data that the TEC continues to gather from the Tool and will provide a useful comparator over time.

Eagle-Ashmore, P. (2012). Accountability and control in adult vocational (foundation) education: Is the adult literacy and numeracy assessment tool a reliable indicator of literacy and numeracy progress? *Journal of Adult Learning Aotearoa New Zealand.* Vol. 40 Issue 1, 92–99.

Keywords: literacy, numeracy, assessment

This article captures the anecdotal evidence that has been discussed in New Zealand since the introduction of the Tool. The research methodology is unclear and it appears to be more of an opinion piece than research based. It describes issues associated with the implementation of the Assessment Tool. These issues include:

- the negative impact on "vulnerable" learners of having to take an "examination" in their first week of learning;

- the length of time it takes for LLN gain (as opposed to the short time frames of programmes where it might not be possible to measure gain);

- assessment items about topics that might not have been covered in learning programmes;

- the negative approach by learners to progress assessments;

- the tension between the Tool being used for both formative and summative assessments; and

- the concern that if it is eventually linked to funding, then teachers will narrow what is taught and teach to the test.

Summary comment

Information from this research is useful for framing discussions around proficiency gain and for showing that more needs to be known about what to expect in relation to proficiency gain over time as measured against the Learning Progressions. This is emerging work and will be watched with interest by the sector. It would be very useful to

have Assessment Tool evidence available when the Programme for the International Assessment of Adult Competencies (PIAAC) survey results come out in 2016 so that any gains in proficiency as measured by the Assessment Tool can be compared to national survey findings.

Priority groups

Whatman, J., Schagen, S., Vaughan, K., Lander, J., Twist, J., Brooking, K., Robertson, S. & Spiller, L. (2010). *Engaging young people/ young adults in literacy, language and numeracy skill development.* Wellington: Department of Labour.[42]

Keywords: literacy, numeracy, youth, motivation, engagement

This research takes evidence from a literature review, key informant interviews and case studies as a means to identify LLN programmes that engage youth and improve outcomes for them. A key idea presented in the report is the difficulty of motivating youth who are more likely to be motivated: extrinsically, for example, by employment preparation or learning in work-related contexts; by a range of approaches to teaching; by the inclusion of mentoring and/ or counselling; and by the ability to access LLN programmes. The key findings from the report include:

- there was little research evidence about where LLN fits into learning programmes that seek to engage youth, including those Not in Education, Employment or Training (NEET);

- it is difficult to measure, in the short term, the impact that LLN gains have on employment;

- along with LLN, youth reported that they were learning a wide range of employment skills including motivation, persistence, decision-making, problem solving, responsibility, self-confidence, and cooperation with peers. At the same time they were gaining unit standards;

- youth who were apparently unmotivated at school can be motivated in vocational programmes that embed LLN;

- NEET youth who were compelled to attend pre-employment programmes because of the social welfare benefits they were drawing, appeared motivated and reported enjoying learning and that they were making progress;

- youth need to be respected and appreciated and develop a sense of belonging created by positive tutor-learner relationships in a warm and welcoming organisation

- it is important for youth to have easy access to programmes; and

- retaining youth in programmes continues to be problematic because of the multiple demands on their lives.

The research developed success indicators of LLN programmes for youth. These can be accessed on page four of the report. This research

Youth who were apparently unmotivated at school can be motivated in vocational programmes that embed LLN.

The model was then trialled with 53 learners in five Literacy Aotearoa poupou. The approach that underpins the model assessment model is that "Maori adult learners will be able to see their literacy learning goals reflected as well-being outcomes in literacy teaching programmes." and in assessments of their learning. (p. 2)

It was beneficial in building a relationship between the tutor and the learner.

It provided learners with the opportunity to reflect on their learning and progress.

is useful for the TEC now and in the future, particularly in relation to the work underway in Youth Guarantee, future work on NEETs and the development of the youth items for the Assessment Tool. The table of success indicators is particularly useful.

Hutchings, J., Yates, B., Isaacs, P., Whatman, J., and Bright, N. (2012). *Hei Ara Ako ki te Oranga: A model for measuring wellbeing outcomes from literacy programmes.* Wellington: Ako Aotearoa.[43]

This research project developed and trialled a Kaupapa Māori assessment model that links adult literacy learning and well-being for Māori learners. The conceptual model was developed through an iterative process of focus groups with learners, tutors and managers. This was followed by two wānanga with experts. The model was then trialled with 53 learners in five Literacy Aotearoa poupou.

The approach that underpins the model assessment model is that "Maori adult learners will be able to see their literacy learning goals reflected as well-being outcomes in literacy teaching programmes and in assessments of their learning" (p. 2). The formative and summative assessments conducted using the model sit alongside the literacy and numeracy assessments conducted through the Literacy and Numeracy for Adults Assessment Tool.

The trial of the assessment model showed that:

- the questions and prompts were useful for tutors and learners;
- it was beneficial in building a relationship between the tutor and the learner;
- it provided learners with the opportunity to reflect on their learning and progress;
- the use of whakataukī grounded participants in Māori ways of working; and
- the tutors thought it was a positive process, but it took time to be properly conducted and they required professional development in order to learn how to use it.

Potter, H., Taupo, K., Hutchings, J., Mcdowall, S. & Isaacs, P. (2011). *He whānau mātau, he wh*ā*nau ora: M*ā*ori adult literacy and wh*ā*nau transformation.* Wellington: NZCER.[44]

This research aimed to find out about the impact on whānau when parents and caregivers participate in programmes that develop their literacy and numeracy skills in English. It was conducted through interviews with four tutors/managers, 23 Māori learners and seven whānau members. The research found that:

- programmes that engage Māori learners take place in culturally safe, small group environments with tutors who care about the success of learners;
- learners were motivated because they wanted to be able to contribute positively to their whānau and support their tamariki

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43. https://akoaotearoa.ac.nz/download/ng/file/
    group-5327/the-kaupapa-maori-wellbeing-assessment-
    model--hei-ara-ako-ki-te-oranga.pdf

44. http://www.nzcer.org.nz/system/files/he-whanau-
    matau-he-whanau-ora.pdf

and mokopuna;

- as a result of the programme learners felt better able to participate in the education of their tamariki and mokopuna, who in turn found more enjoyment in learning and schooling;

- learners made a greater contribution to whānau activities; and

- whānau relationships were strengthened as a result of the learners' improved communication skills.

May, S. (2009). *Hangaia te mātāpuna o te mōhio: Learning foundations for Māori adults.* Wellington: Ministry of Education.[45]

Keywords: Māori, adult learners

This report summarises three research projects[46] that explore how success for Māori adults in the learning foundations of literacy, language and numeracy can be built on the foundations of Māori culture and identity. While this summary report was based on three reports on literacy and numeracy learning for Māori learners, it does not specifically address literacy and numeracy per se, rather it deals more generally on conditions that create success for Māori learners.

The evidence from the reports shows that:

- Māori learners can overcome previous negative experiences at school when they experience educational achievement and success;

- Māori learners often have significant social and economic barriers to overcome to access learning, alongside wider family commitments;

- Māori are not a homogeneous group and bring diverse experiences with them;

- there needs to be a holistic approach to teaching and learning programmes – an approach that acknowledges whānau and is about more than just the individual;

  - overcoming negative experiences is helped by courses based on Māori tikanga and pedagogies such as whakawhanaungatanga and tuakana/teina;

  - Māori values and protocols, such as those listed below, are also highly valued by students and tutors and seen as central to the success of programmes:

    - Te noho ā marae – marae kinship

    - Te hononga ā-iwi – shared iwi links

    - Te noho hei whānau – deliberate act of teamwork

    - Te noho rūmaki – protocols and customs

    - Kanohi ki te kanohi – face to face (implies frankness)

    - Te manaakitanga – fostering relationships

Māori learners can overcome previous negative experiences at school when they experience educational achievement and success.

45. http://www.educationcounts.govt.nz/__data/assets/ pdf_file/0007/55717/09-07-02-Learning-Foundations-for-Maori-Adults2.pdf

46. White, H., Oxenham, T., Tahana, M., Williams, K. & Matthews, K. (2009). Mā te huruhuru, ka rere te manu: how can language and literacy be optimised for Māori adult learning success? Wellington: Ministry of Education; McMurchy-Pilkington, C. (2009). Te pakeke hei ākonga: Māori adult learners. Wellington: Ministry of Education; Mlcek, S., Timutimu, N., Mika, C., Aranga, M., Taipeti, N., Rangihau, R., Temara, M., Shepherd, Y. & McGarvey, H. (2009). Te piko o te māhuri, tērā te tupu o te rākau : language and literacy in marae-based programmes. Wellington: Ministry of Education.

Marae-based learning can be particularly beneficial for Māori learners as marae "equals identity" and provides "accessible, safe and culturally congruent learning context. (p 11)

- ○ Te tuwheratanga – openness
- ○ Te whakapono – trust. (p.7)
- deliberate acts of teaching and tracking language acquisition improve results
- strong relationships between the students and the tutor that incorporates quality teaching;
- insufficient numbers of teaching staff qualified to teach Māori students and the need for more professional development that support tutors to teach in a culturally appropriate way; and
- marae-based learning can be particularly beneficial for Māori learners as marae "equals identity" and provides "accessible, safe and culturally congruent learning context" (p 11).

Tuagalu, C. (2012). *Engaging pacific migrant workers in literacy, numeracy & financial literacy training: Reflections on the research process*. Wellington: Ako Aotearoa.[47]

Keywords: workplace learning, literacy, numeracy, Pasifika

The project drew evidence from a literature review and interviews with learners, their tutors and employers involved with a twenty-hour workplace literacy, numeracy and financial education programme for Pacific workers in New Zealand as part of the Recognised Seasonal Employer Scheme. It can be considered an action research project as it was conducted by a tutor on the programme[48].

The factors that contributed to success for Pasifika included:

- the creation of a Pacific place of learning through artefacts, for example, tapa cloth, video and audio clips; the use prayer and song at the beginning and end of lessons; the opportunity for learners to tell their stories;
- the learners were provided with the opportunity to co-construct the curriculum and given the opportunity to practise their learning;
- the opportunity to practise was more beneficial for the learners when it was in a real life setting;
- tutors who made the most difference were those described as "respectful, caring and understanding" (p.32); and
- the use of Pasifika languages and translation to and from English supported the learners.

Summary comment

There was surprisingly little research available on LLN and the priority groups. More needs be known about the LLN practices that engage the learners in these groups and the impact of LLN programmes on them. However this research is useful for the TEC, particularly in relation to how to assess wider outcomes that occur for learners and

47. https://akoaotearoa.ac.nz/ako-hub/ako-aotearoa-northern-hub/resources/pages/engaging-pacific-migrant-workers

48. A full evaluation of the programme was conducted by Mathea Roorda and can be found on https://www.aid.govt.nz/webfm_send/17. It has not been used in this bibliography as it assesses the overall programme rather than looking just at the success factors for Pasifika that relate specifically to literacy and numeracy.

their families through literacy programmes. There is a strong base of research already available on what leads to success for Māori and Pasifika learners, and this can to be built on in relation to LLN.

Using ICT to enhance literacy and numeracy skills

Salomon, M. (2009). *Workplace literacy and essential skills: What works? and why?* (2009). The Centre for Literacy of Quebec.[49]

Keywords: workplace learning, literacy, e-learning, blended learning

This information is taken from a wider literature review on workplace literacy programmes that has not been included in this bibliography as the findings are similar to the other research reported here. However the information on blended and e-learning is worth including. The key points related to this in the context of workplace learning include:

- LLN programmes in the workplace benefit from blended learning, that is, the use of multiple teaching methods, including e-learning;

- blended learning is more likely to meet the needs and schedules of workplace learners and increases the likelihood of recruiting and retaining workers;

- a UK project showed that learners in basic skills programmes responded positively to e-learning (either in the classroom or by distance). However older men were resistant to learning this way and other learners were limited by their degree of familiarity with computers and the internet;

- the UK study also showed that e-learning was not right for all learners; and

- a US study noted that not all learners have the discipline to benefit from distance e-learning.

Davis, N., Fletcher, J., Brooker, B., Everatt, J., Gillon, G., Macke, J. & Morrow, D. (2010). *E-learning for adult literacy, language and numeracy: a review of the literature.* Wellington: Ministry of Education.[50]

Keywords: literacy, numeracy, embedding, e-learning

This research investigated how e-learning can be used to reach a greater number of adult learners and better meet their learning needs. These findings are from a literature review and are supported by a case study in one New Zealand polytechnic. While the review found no direct research evidence showing e-learning improves adults' LLN skills, it did find the following:

- distance e-learning is a cost effective way to develop the skills of those assessed at Level 2 in the ALL survey;

Blended learning is more likely to meet the needs and schedules of workplace learners and increases the likelihood of recruiting and retaining workers.

Tutors require professional development in order to develop or make changes to programmes that include e-learning and embed LLN into e-learning.

- e-learning is relevant and useful for most adults with LLN needs, provided it is designed to fit their proficiency levels in literacy and digital technologies;

- tutors require professional development in order to develop or make changes to programmes that include e-learning and embed LLN into e-learning;

- e-learning is more effective when it is part of face-to-face training, that is blended learning approaches are more effective;

- e-learning may well be a way to retain learners in programmes of learning;

- e-learning is more effective where it has an employment focus rather than a generic LLN focus;

- acknowledging cultural context is important for Māori and Pasifika learners; and

- e-learning can provide a good source of motivation and practice for ESOL learners.

Thomas, G. & Ward, J. (2010). *Numeracy for adults: building skills with online learning links.* Wellington: Ministry of Education. [51]

This study included a literature review and case studies of five industry trainees who used online learning activities that supported their numeracy learning in the workplace. The trainees were assessed and then directed to activities that would address their specific skills gaps. In relation to ICT and the development of numeracy skills the study found that:

- using ICT made learning more engaging and increased the learners' motivation and persistence;

- learning through ICT outside the classroom provides the opportunity for learners to tap into support networks, e.g., family, friends;

- learning through ICT makes learning more accessible as it can be undertaken at a time that suits learners; and

- the learners in the study made gains of one to two stages in the strand of the Learning Progressions that was their focus. This gain was made over a very short time frame

- learners were able to apply their new numeracy skills in their personal and working lives.

Maths Technology Limited. (2011). *Pathways Awarua: Outcomes for learners in 2011.* Tertiary Education Commission. Unpublished report.

This evaluation gathered evidence from users of Pathways Awarua from July to December 2011 when it was first introduced. The data was gathered through surveys of 39 educators and 92 learners,

51. http://www.educationcounts.govt.nz/publications/
tertiary_education/numeracy-for-adults-building-skills-
with-online-learning-links/1.-introduction

interviews with 12 learners who had made the greatest gain as assessed through the Assessment Tool and their educators (eight in total). Achievement data was captured by the Assessment Tool and completion of modules was captured through the Pathways Awarua learning files. Most of the learners were using Pathways Awarua once to twice a week.

The evaluation showed that:

· learners were very engaged with Pathways Awarua with most of them being repeat users;

· the accuracy rate of 93 percent showed that most learners repeat activities until they have all the answers correct;

· the heavy usage at the lower levels suggested that most learners are choosing to start at the beginning;

· the learners were enthusiastic about Pathways Awarua and appreciated being able to retry questions until they got the right answers and learning at their own pace;

· educators appreciated that learners were able to retry questions and valued that they could track what the learners had tried and completed;

· most of educators planned to use Pathways Awarua in future programmes; and

· the majority of educators would like to have been able to select more contextualised pathways for their learners.

The evaluation also measured the reading and numeracy gain of learners. However, as these learners were also involved in learning programmes their gain cannot be attributed solely to the use of Pathways Awarua.

Summary comment

As with the priority groups there was little research available about LLN and e-learning. With the increasing uptake of Pathways Awarua there is the opportunity to find out more about who is using this resource, how it is being used and the impact on learners.

Other literacies

While the purpose of this bibliography was literacy and numeracy, publications that comment on wider literacy policies that have relevance for New Zealand LLN policy are included here.

Balatti, J., Black, S. & Falk, I. (2009). *A new social capital paradigm for adult literacy: Partnerships, policy and pedagogy. Adelaide: National Council for Vocational Education Research.*[52]

Keywords: literacy, numeracy, health literacy, financial literacy

This report continues the theory that Balatti, Black et al. have in

> *Most of the learners were using Pathways Awarua once to twice a week.*

52. http://www.ncver.edu.au/publications/2170.html

The research concludes that Essential Skills provide the foundation for financial literacy, but that financial literacy itself is not an essential skill because of the financial knowledge that goes with it, which is in addition to basic skills.

relation to literacy as social capital (these publications are not included in this bibliography). However, the researchers make some important points for the New Zealand context in relation to financial literacy and health literary. These include:

- The increasing number of health literacy and financial literacy programmes that are not linked into wider vocational teaching and are not being taught by providers who have literacy and numeracy expertise. Teachers in these programmes do not see their work as involving the teaching of literacy and numeracy; and

- There needs to be greater connectedness between the providers of financial literacy and health literacy programmes, education providers and communities.

Canadian Foundation for Economic Education (n.d.). *Essential skills and financial literacy: exploring the correlations, compatibility, and success factors.* Office of Literacy and Essential Skills Human Resources and Skills Development Canada.[53]

Key words: Essential skills, literacy, numeracy, financial skills

This study explores whether financial literacy should be added to the Essential Skills list in Canada. The research was conducted through a literature review and interviews with subject matter experts.

The study found limited empirical research on the links between literacy and financial literacy, but did find links between the Essential Skills of numeracy, thinking skills, reading text, and document use. The research concludes that Essential Skills provide the foundation for financial literacy, but that financial literacy itself is not an essential skill because of the financial knowledge that goes with it, which is in addition to basic skills.

New Zealand Vocational Education & Training Research Forum. (2011). *Financial literacy as a context for strengthening literacy and numeracy for adults: Postgraduate research show case.*[54]

Keywords: literacy, numeracy financial literacy

This presentation of post-graduate research shows that learners can be motivated to learn about financial literacy, which provides the context for embedding literacy and numeracy.

Bunker, B. (2010). *A Summary of International Reports, Research and Case Studies of Digital Literacy: Including implications for New Zealand of adopting a globally-recognised digital literacy standard.* New Zealand Computer Society.[55]

This literature review outlines the importance of digital literacy in terms of enhancing the personal and working lives of individuals and contributing to workplace productivity. The key findings from the report include:

53. http://www.cfee.org/en/pdf/CFEE%20Financial%20 Literacy%20and%20Essential%20Skills%20-%20Final%20 Report%20July%202012.pdf

54. http://www.itf.org.nz/assets/Events-and-Forums/2011-Events/NZ-VET-Research-Forum-2011/Session-1-Remnant.pdf

55. http://www.iitp.org.nz/files/201001%20Digital%20 Literacy%20Research%20Report.pdf

- the increasing need for all adults to be able to use ICT given the number of services, including government services, that need to be accessed online

- improving the digital literacy skills of the workforce has the potential to bring about productivity gains

- increasing the digital literacy skills of marginalised groups allows them to participate more fully in society.

Summary comment

There is increasing interest in New Zealand in health literacy and financial literacy. For example, workbase is heavily involved in teaching health literacy and developing related resources while Literacy Aotearoa has financial literacy education programmes. There is also an increasing demand from workplace literacy providers (in the employer-led space) to include digital literacy and financial literacy into their programmes. It may well be time to consider 'policy' in relation to where these literacies sit within the TEC's LLN work stream and funding structures.

Return on investment

Department of Labour. (n.d.) *The impacts of LLN training programmes on firm performance: A summary of the findings of the 'Return on Investment' case studies.* Unpublished report.

Keywords: workplace learning, literacy, cost-benefit

This paper summarises the findings of return on investment case studies conducted in three New Zealand workplaces between 2007–2009. These workplaces ran on-site literacy programmes funded through the TEC's Workplace Literacy Fund. The key findings from the summary include:

- the lack of robust data held by firms that can be used

- the difficulty of isolating the impact of one training programme from others that are occurring in companies

- the finding that in one firm the reduction in staff turnover was large enough to make the programme cost effective, but did not take into account other factors that may have accounted for this reduction

- the failure of the studies to find conclusive evidence of cost-benefit does not mean that the programmes have no impact, rather it points to the difficulty of research of this nature.

The paper also reports that, in spite of considerable interest and funding of literacy and numeracy programmes internationally, there was a shortage of research publications on return on investment.

If research of this kind is to be undertaken, the paper concludes

Improving the digital literacy skills of the workforce has the potential to bring about productivity gains.

that, "In order to have sufficient statistical power to identify the effect of the training on a given outcome variable with reasonable confidence (i.e., to have a reasonable chance of obtaining a statistically significant result), the training intervention may need to be reasonably substantial, and the number of sites and/or number of time periods may need to be relatively large" (p. 8).

Dorgan, J. (2009). *A cost benefit analysis of adult literacy training.* Dublin: National Adult Literacy Agency.

Keywords: literacy training, economic returns, cost benefit

This study aims to estimate the return on investment for countries who invest in literacy and numeracy programmes for adults. The study includes a review of literature focussed on quantifying the effect of training on literacy standards, then evaluates the economic impact of higher standards, and looks at social impacts. The author concludes that there are income gains to individuals of around 30 percent through improving literacy scores by 100 on the IALS scale, and as a result there are also returns to government in the form of taxes. There are also wider social gains that are already reported in this bibliography. As with the return on investment literature research cited above, the report also notes the difficulty of undertaking research of this kind given the paucity of data on the outcomes of literacy programmes.

Summary comment

Return on investment studies are difficult for the reasons outlined above. It will be worthwhile keeping track of the instruments that are currently being developed and trialled by the Australian Council for Educational Research (ACER). These instruments will allow employers to record the productivity benefits that arise from LLN training, the cost associated with the training and this will provide them with the basis for estimating the return on their investment.

CONCLUDING COMMENTS

New Zealand has taken a consistent and focussed approach to LLN policy, practice and funding over the last 10 or more years, and the research summarised in this bibliography shows that NZ's work in this area stacks up well internationally. Based on the evidence outlined above, New Zealand's approach should be effective to improve personal, economic and social outcomes for learners. However, as it takes time for outcomes to emerge, these improvements will only be verified through evidence gathered over time in the New Zealand context, and there are many complicating challenges to this evidence-gathering.

Currently the impact of specific interventions is measured through the Assessment Tool, which gives a measure of changes in proficiency. But, as the evidence shows, this measure on its own is not enough, so consideration needs to be given to what literacy and numeracy practices could be measured, how these would be measured, and over what timeframe.

Another challenge relates to describing what is meant by proficiency gain and what can be expected over what time period. One hundred hours comes through consistently in the literature as the teaching time being required to show gain. This finding comes from a robust longitudinal study. However, it is 100 hours for a level gain, which is not how proficiency gain is described in New Zealand's Learning Progressions.

The final challenge in the New Zealand context relates to embedding. The studies in this bibliography show that it works, but only with conditions in place related to whole-of-organisation approaches and programmes that are informed by LLN and vocational content.

While the evidence describes what works and how this improves outcomes for learners, more still needs to be known about:

- embedded LLN practices at classroom and organisational level;

- the role of LLN in engaging and retaining priority learners and the subsequent outcomes for them;

- the role of ICT and how this might be used to reach learners within and outside programmes. It could be useful to explore how Pathways Awarua is being used and the impact of its use; and

- the connections between LLN and wider literacies, such as health, financial and digital literacy, and the place that these have within the context of literacy and numeracy work in New Zealand.

Overall, the current LLN work in New Zealand can be viewed as one stage in an on-going project that still requires considerable change across education and industry sectors and systems. The LLN work over the years has been, and still is, a major educational change project. Fullan (2007) has categorised educational change into three phases: initiation, implementation and institutionalisation. In these terms, New Zealand is probably still in the implementation phase, with substantial

The final challenge in the New Zealand context relates to embedding. The studies in this bibliography show that it works, but only with conditions in place related to whole-of-organisation approaches and programmes that are informed by LLN and vocational content.

activity underway and focus now being directed towards collecting evidence of benefits for learners, and pinpointing specific elements of LLN implementation that optimise those benefits. There is still a way to go before the many aspects of LLN activity can be described as business as usual and it is institutionalised in educational provision and training in New Zealand.

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Embedding LN
Baseline Knowledge

Knowing the learner

4 Diagnostic

Assessment results
- Collating
- Analysing
- Recording
- LN focused learning plans
- Negotiating with learners
  - Learning outcomes
  - Including independent learning
  - SMART timeframes

Tools & processes
- Finding
- Contextualising
  - Teacher made
  - Adapting others
- Using
  - National assessment tools
  - Online adaptive
  - Paper based
  - Others

Specialist referral

Knowing the demands

3 Mapping

My training
- Training objectives
- Analysis of LN demands
  - Using the language of the progressions
  - Examples & samples
  - Texts
  - Tasks
  - Calculations
  - Vocabulary
  - And more
- Specific context

Context specific demands
- Numeracy
  - Number
  - Measurement
  - Statistics
- Literacy
  - Read
  - Write
  - Listen
  - Speak

Learning progressions
- Best guess
- Working knowledge

2 Good teaching

Approaches & methods
- Case Study: Āhuatanga Māori
  - Ako
  - Tuakana-teina
  - Whakapapa
  - Whanaungatanga
  - Kaitiakitanga
  - Mana atua
  - Mana ao turoa
  - Mana whenua
  - Mana tangata
  - Mana reo
  - Mana whenua
  - Tino rangatiratanga
  - Whare tapa whā

Relevant theory
- Literacy
- Numeracy
- ESOL
- Teaching & learning
- Culture
- Context

1 Context

Definitions
- Māori LN
- ALLS
- TEC
- Others

Resources available
- Specialist organisations
- Online
- Print

Reasons for low LN
- Others
- Technological
- Socioeconomic
- Educational

Impact of low LN
- Others
- Workplace
- Social
- Economic

Case Study: NZ background
- Development
  - Pre-colonisation
  - Oral traditions
  - Arts & crafts
  - Geography
  - Others
  - Māori LN
- Initiatives
  - Māori language
  - English language
  - Policy
  - Others
  - National LN infrastructure
  - Provider-based
  - Industry-based
  - By Māori for Māori
  - My organisation
  - Others
- Issues
  - Post-colonisation
  - Post-treaty
  - Iwi development
  - Other

Knowing what to do

5 Embedding LN

Deliver embedded training
- Explicit
- Contextualised
- LN learning activities
- Teaching strategies

Plan LN skills development
- Embedded learning outcomes
- Resources
  - Tasks
  - Texts
  - Teaching plans

6 Assessing progress

Formative vs summative
- Feedback
- Self assessment
- Reuse diagnostic
  - Pre-test
  - Post-test

Methods
- Involving learners
- Relating to...
  - Programme objectieves
  - Learner needs & goals
  - Learners LN skill levels

7 Evaluating effectiveness

Collaborating with
- Learners
- Supervisor
- Others

Identifying changes & improvements

Reporting to stakeholders
- Informs planning
  - Future PD
  - Learner LN skill development

Reflecting critically
- Teaching strategies
- Learning activities
- Assessment methods
- Management of delivery