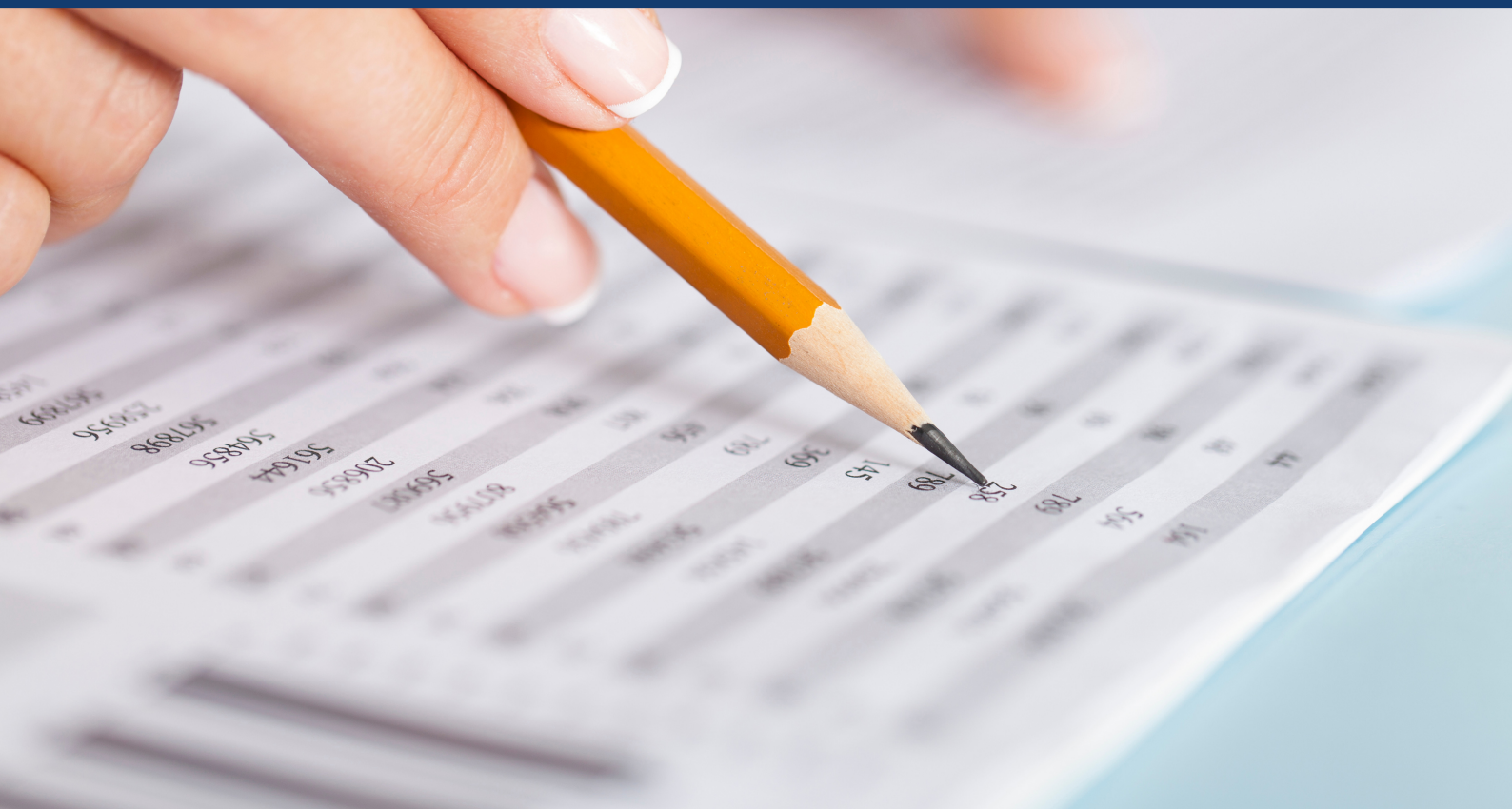


THE EXPRESSION, EXPERIENCE AND TRANSCENDENCE OF LOW SKILLS IN AOTEAROA NEW ZEALAND



WORKING PAPER 1

ADULT LITERACY AND NUMERACY
IN AOTEAROA NEW ZEALAND:

CONTEXT, CONCEPTUAL ISSUES AND EXISTING
EVIDENCE

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ABOUT THIS RESEARCH PROGRAMME

Over 1.3 million adult New Zealanders live with low literacy and/or numeracy (L+N) skills, with a strong over-representation of Māori and Pacific peoples. This has significant economic and social costs, including increased risk of unemployment and poverty, detrimental effects on physical and mental well-being, and decreased social and political attachment.

This programme applies a mixed-method approach to the following research aims: to build a detailed population-wide picture of those with low L+N skills; analyse their life-course pathways and effectiveness of interventions with respect to a range of economic and social outcomes; forecast future changes in population skill level; and develop an understanding of the barriers and enablers that build resilience to risk, along with pathway to transcend low skills.

For further information about our programme and other outputs, see www.workresearch.aut.ac.nz/low-skills

ABOUT THIS PAPER

This working paper provides a literature review to inform the research programme 'The experience, expression and transcendence of low skills in Aotearoa New Zealand'. It examines conceptual and definitional issues and relevant aspects of the NZ context, and provides a high level overview of existing evidence. It traces recent developments and debates in the measurement of skills and discusses the implications that arise from these debates in light of the unique bi-cultural context of NZ. It discusses what is meant by 'skill' and the related concept of competency, and how these terms are associated with literacy and numeracy. It looks at how the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) defines and measures skills. It also looks at the existing evidence on NZ's skill levels and patterns and the importance of skills to economic outcomes and wellbeing.

DISCLAIMER

The views expressed are those of the authors and do not necessarily reflect the views of the organisations involved.

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1 Introduction

This literature review informs the project '**The experience, expression and transcendence of low skills in Aotearoa New Zealand**'. The overarching goal of this mixed-methods project is to provide policy recommendations to improve the life-course trajectories and socioeconomic outcomes of adults living with low literacy and/or numeracy (L+N) skills. The research aims to shape the ways in which we seek to enhance L+N in Aotearoa New Zealand (henceforth Aotearoa NZ; Aotearoa and NZ will be used interchangeably) with a focus on effective intervention. Its strength lies in the insights that the mixed-methods investigation can provide on the ways in which skill acquisition interplays with other facets of everyday family and community life and societal participation.

This research is in line with the Organisation of Economic Cooperation and Development's (OECD's) long-established emphasis on skills development as key to the social and economic success of individuals and the economy. It also takes into account the more recent strong focus on wellbeing as evident in the OECD's Better Life Initiative and the NZ Treasury's Living Standards Framework. Crucially, this project acknowledges that those New Zealanders most severely negatively affected by low L+N skills and/or whose low L+N skills contribute to their precarity are Māori, and that as a nation we cannot continue historic patterns of response if we wish to reverse this situation. The project offers a unique opportunity to view low skills and the challenges they present for the quality of life of all New Zealanders from a fresh, integrated and holistic perspective.

The mixed-methods approach of this project has two main, complementary elements. First, quantitative measurement of L+N will allow us to identify patterns relating to risk and protective factors for low skills, and the relationship between skills and socioeconomic outcomes at the population level. This will provide an indication of which groups, within the population as a whole, may be most affected by low L+N, and what some of the consequences of low L+N may be. However, these statistical generalities provide limited insight into the lived experiences and practical implications of low L+N at the personal, family and community levels. This quantitative work will, therefore, be coupled with in-depth qualitative research into adults living with low L+N skills that will allow us to understand these lived experiences and provide more practical insights and guidance on effective policy interventions.

The purpose of this literature review is to trace recent developments and debates in the measurement of skills and to discuss the implications that arise from these debates in light of the unique bi-cultural context of NZ. Section 2 delves into what is meant by 'skill' and the related concept of competency, and how and why these terms are associated with literacy and numeracy. Since the quantitative component of this project will use data from the Survey of Adult Skills (SAS) component of the OECD's Programme for the International Assessment of Adult Competencies (PIAAC), Section 3 takes a closer look at what is meant by 'skill' in the more specific context of PIAAC and how PIAAC defines low skill levels. It also presents some critical perspectives on the OECD approach. Section 4 looks at why skills matter. It discusses how skills are a central policy tool for achieving growth and equity goals and reviews evidence of the relationship between skills and economic and wellbeing outcomes. Section 5 looks at the Aotearoa NZ context discussing NZ's unique bi-cultural character and Tagata Pasifika in NZ. Section 6 gives a high-level overview of the NZ education and training system, focussing on key aspects relevant to the adult L+N landscape. Section 7 establishes NZ's skill levels and patterns, highlighting that while NZ has a high level of skills overall, issues remain. Section 8 concludes.

As mentioned, the quantitative component of this project will focus on the use of OECD large-scale assessment surveys, particularly PIAAC. As such, this literature review often pays specific attention to the OECD approach and measurement tools. These are a solid basis for providing a broad picture of adult L+N in NZ. However, as will be discussed, they have limitations which must be kept in mind when interpreting their results. For example, they use a specific measurement of 'skills' that does not necessarily reflect the true competencies of individuals in their everyday lives. It is essential to remember this point in relation to Māori, whose skills lie in many directions that differ from their non-Māori counterparts, as is the case across all differing cultural groups.

2 Towards clarifying key terms and relationships: Skill, competency, literacy and numeracy

The terms 'skill' and 'competency' logically feature in skills development policy and discourse and often in conjunction with 'literacy and numeracy'. But what is meant by these terms and how are they connected in these settings? The contested and complex nature of the concepts these terms represent means there is no straightforward answer to these questions. However, as fundamental components of skills development work and this current research, particularly in relation to how skills are measured, we discuss them here.

2.1 The meaning of 'skill' is varied and contested

What constitutes a skill or skills is contentious (Scandurra & Calero, 2017). Skill formation theorists highlight the complex nature of skill, including that it is socially constructed (Rigby & Sanchis, 2006; Payne, 2017). The social construction of skill means that its conceptualisation varies depending on the country in question. In addition, different conceptualisations of skill are socially and politically embedded in the education and employment relationship systems of nations. These country-specific systems often embody historical definitions of skills. For example, in many western nations, the traditional divide between vocational and academic learning places greater cultural value on academic learning, which can result in skill formation systems that are ill-equipped to deal with the changing nature of work (Lloyd & Payne, 2002; Thelen, 2004; Clarke & Winch, 2006; Rigby & Sanchis, 2006).

Despite these conceptual challenges, various attempts at defining skills have been made. The European Commission's Centre for the Development of Vocational Training (Cedefop) glossary, as used by OECD commentators, defines skills simply as "the ability to perform tasks and solve problems" (cited in Ananiadou & Claro, 2009, p. 8). But this definition fails to capture the complexity of skills. Mounier has addressed the complexity missed by this definition by classifying skills into categories that each have their own set of 'logics' that operate at different levels such as advanced and routine. The classification includes three discrete logics of skill: cognitive, technical and behavioural (Buchanan et al., 2001, p. 18):

- Cognitive skills: A foundation of general skills obtained on the basis of general citizenship (eg, literacy, numeracy, general education competence)
- Technical skills: Skills associated with the purchase of labour on the open market to perform particular tasks (e.g., recognised trade or professional skills)
- Behavioural skills: Personal skills associated with labour's ability to perform in the context of particular authority relations on the job (e.g., usually subordinate roles in the production process or the vision of a particular service).

Mounier's system is similar to that used by the United States Dictionary of Titles that classifies "skills as involving different levels of work with Data, People, and Things, corresponding to cognitive, interpersonal (or interactive), and manual (or physical) skills" (Handel, 2012, p. 8).

These definitions, however, do not adequately account for one particular feature of skill; that is, its location or context. A definition advanced by Grugulis et al. (2004) addresses this shortcoming. It classifies skill as “that which resides with the person, that which resides with the job, and that which is socially constructed” (cited in Buchanan et al., p.7). This definition links to Littler’s conceptualisation: “skill as work routines, skill as socially constructed status and skill as control over process and product” (Littler, 1982, p. 18 cited in Bolton, 2004, p. 20).

While these definitions differ from one another, there are some areas of commonality. The first area of commonality is that skill is socially constructed. Therefore, context plays a key role in what is classified as skill, how and, very importantly, which skills are valued more broadly in a society, and how policy settings and the education system seek to measure and advance them. A second commonality is that skill is something that is done. For example, skill as control over a process and product, or skill as performance or decision making. A third consideration is the relevance of place and actors in the application, recognition and deployment of skill. For example, Grugulis et al. (2004) focuses on distinguishing between skills in a job (or skills as work routines) and skills that reside in the person.

A fourth common feature is the acknowledgement that there are different kinds of skills that are deployed with different levels of complexity. One way the literature has tried to grapple with this variability in skill complexity is by looking towards literacy and numeracy skills – the focus of this research – embedded within other skills as a mitigating factor, on the basis of a belief that enhancing L+N will enhance the learning and application of other skills. Thus, L+N are often thought of, or treated as, domains of skill in their own right in much the same way we think of surgical skills or construction skills, for example; simultaneously they are also thought of as foundational to other skills (Ministry of Education [MoE], 2002).

In order to understand skill and its capacity to contribute to economic, social and cultural capital, the system of skill formation also needs to be understood. That is, the supply, demand, development and deployment of skill. One concept that has been used to draw attention to all four areas is skill ecosystems. The skill ecosystems approach is designed to encourage policy makers, to conceptualise skill needs in a way that encourages policy debate beyond the confines of the education and qualification systems (Anderson & Warhurst, 2012). As such, the ecosystem concept highlights the complex interactions between employers/organisations, the communities that they reside in and the individuals that are employed. The concept can be used to determine why skill formation systems are failing and how these co-ordination failures could be addressed (Buchanan et. al., 2017). In addition, the model recognises that skill development, demand and use are in a constant state of change, thus policies and interventions in a skills formation system also need to capture this dynamism.

2.2 Competency is more than skill, but the terms are often conflated

Researchers generally see skill, alongside knowledge, as an important component of competency. However, the terms are often conflated. For example, while the OECD’s PIAAC is the *Programme for the International Assessment of Adult Competencies*, it is described by the OECD as a programme of assessment and analysis of adult *skills* and the major output of this programme is the *Survey of Adult Skills* (see, for example, OECD, 2019c).

Significantly, the OECD has placed more attention on defining what is meant by competency. In this process, it has provided a basis for understanding its relationship to skill in the OECD’s uses of these

terms. Indeed, the definition of competency is important to operationalising a definition of skill due to the way the two terms are often conflated, but also due to the ways in which skills are operationalised by individuals, workplaces and communities. The OECD makes the following distinction between the two:

A competence is more than just knowledge or skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competence that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating (Rychen & Salganik, 2003 cited in Ananiadou & Claro, 2009, p. 8).

In its Definition and Selection of Competencies (DeSeCo) Programme, in which the meaning and constituent elements of 'essential' competencies were explored, the OECD defined competency as: "The ability to apply learning outcomes adequately in a defined context (education, work, personal or professional development). In this definition, a competence is not limited to cognitive elements (involving the use of the theory, concepts or tacit knowledge); it also encompasses functional aspects (involving technical skills) as well as interpersonal attributes (e.g., social or organizational skills) and ethical values" (Ananiadou & Claro, 2009, p. 8). Competencies, therefore, comprise skills, knowledge and attitudes when applied.

Application or practice is a key part of how competencies have been defined in the DeSeCo programme. Competencies as practices have been classified into three broad categories: the use of tools; engagement and interaction with others; and the capacity to act autonomously (Ananiadou & Claro, 2009; OECD, 2019c). 'Thinking' is a 'cross-cutting' competency integral to the three categories (OECD, 2005; Hipkins, 2006). Despite the emphasis on the individual in these categories, the OECD acknowledges that competencies reside at different levels in society, including institutions (OECD, 2019c). The New Zealand work on competencies is discussed in Section 6. The NZ framing of competencies used throughout the education system is overtly linked to values pertinent to our nation.

2.3 Literacy and numeracy also have varied and contested meanings

As noted above, literacy and numeracy can be thought as domains of skills (or competencies) in their own right and as embedded in and foundational to the development of other skills. Importantly for our research, they are also thought of in a third way, as social practices (e.g. Barton, 2007). Like skills, definitions of L+N are varied and contested (Auerbach, 2008; Graff & Duffy, 2008; Street, 1984, 2014). There are diverging views on what L+N is thought to be, and also in what it is thought to do for people and society – its purposes.

Often the way the term is used is not defined (Perry et al., 2018). Literacy is sometimes discussed separately from numeracy. At other times the term literacy is used when inclusion of both literacy and numeracy is intended. Definitional issues are further compounded by the use of many other terms as if they have the same or similar meanings. Such other terms include basic skills, basic cognitive skills, foundation skills, key generic skills and functional literacy and key competencies (MoE, 2002; Perry et al., 2018). Further, the terms 'skill' or 'competency' may be added to L+N, with or without distinction. While these terms often overlap, they can also have important differences in meaning. Therefore, indeterminate use of such terms can be problematic. It can also have practical implications. For

example, a lack of clarity over whether numeracy is included in the term literacy might impact on budget spend or programme enrolments.

At a more complex level, debates about the meanings of literacy and numeracy have focussed most strongly on meanings of literacy with two broad pathways clearly emerging: literacy as skills and literacy as social practices. The idea of literacy as skills includes the notion that literacy is a fixed set of technical communicative abilities that people learn. When literacy is defined in this way, attention is often focussed on reading skills and strategies including decoding, word recognition, vocabulary, comprehension and fluency (Perry et al., 2018). Writing skills, such as spelling or morphological awareness, are also often, but not always, included (Talwar et al., 2014; Fracasso et al., 2016, both as cited in Perry et al., 2018). The literacy skills of interest in western nations are text-based and very often in the English language. They are treated as though they are 'autonomous' (Street, 1984, 2003) and thus unconnected to context. This tendency to treat literacy as an autonomous skill occurs despite the understanding that does exist that skills are socially constructed and context related as we saw in section 2.1. This view of literacy - as a singular set of autonomous skills - predominates in western nations where it pervades the main institutions.

In contrast, Street (1894) regards this view of literacy as 'ideological' because it dominates in an unquestioned way. It is treated by societies' main institutions as the only literacy or the only literacy that counts. This is problematic because as decades of research has shown, there are many literacies (Cope & Kalantzis, 2000) and many modes of literacy, including modes of literacy that operate simultaneously – multimodal literacies (Jewitt & Kress, 2003) – that people use in their lives. As Hamilton and Barton (2000, p. 379) summarise, "there are different literacy practices in different domains of social life, such as education, religion, workplaces, public services, families, community activities; they change over time and these different literacies are supported and shaped by the different institutions and social relationships".

The effect of the dominance of one form of literacy is that other forms are marginalised. This point was emphasised in *Te Kawai Ora: Reading the world, reading the word, being the world* (Māori Adult Literacy Working Party, 2001) in its response to the NZ Adult Literacy Strategy where literacy for Māori was described as bi-literacy – literacy in both English and Māori – and as including other text forms relevant in te ao Māori such as geographic features of tribal lands, tukutuku panels in whare, and indeed the positioning of whare on the marae. Understanding this counter perspective – that there are many literacies and modes of literacy that are valued by people – is crucial to understanding why the OECD's work must be both valued for its vast contributions to understanding the concept of skill and simultaneously open to scrutiny for its (potential lack of) relevance to all people in its member countries.

Further, four decades of research supports a view of literacy as primarily social and cultural practice (e.g. Scribner & Cole, 1981; Barton & Hamilton, 1998; Heath, 1983; Pahl, 2016). This social practice view of literacy does not exclude the notion of literacy as skills but rather clarifies that literacy is not only skills. Literacy is primarily a relational activity in which the meaning of literacy lies in its uses and the meaning of its uses to people in their lives not in the literacy itself. History, culture and the social and economic circumstances associated with all the "data, people and things" (Handel, 2018, p. 8) present in any L+N activity are also present.

Action where L+N is involved will always be *interaction*, in other words relational activity (Barton, 2007) as people, things, history and culture come together. This is the case for any skill but is not commonly accounted for. Where L+N are embedded in other skills, which is invariably the case, all domains of skill involved (literacy, numeracy, surgical or construction for example) are rendered relational, with social,

cultural and historical meaning for those involved. In Barton and Hamilton's (1998) words literacy, numeracy and language are "activities that people carry out and which relate to and are shaped by all the other activities they engage in throughout their lives, rather than just as skills or cognitive attributes that people have or do not have" (p. 52). Indeed, Perry et al. (2018, p. 83) observe that "decades of research have shown that culture and context shape literacy and cognition in fundamental ways". Contexts in this sense are seen as containers in which social meaning is realised (Burnett & Merchant, 2018).

While the role of context is recognised in both the literacy-as-skills and literacy-as-social practice approaches, the role of context is less prominent in the skills approach. For example, the skills may be packaged as, say, 'literacy and numeracy', 'skills for life' or 'essential skills' and then treated as being the same for all lives in all contexts (Hanemann, 2015, p. 309, cited in Perry et al., 2018, p. 83). Recent expansions of sociocultural theories of literacy conceptualise context differently. Rather than being seen as container-like settings, contexts are seen as entities that arise through shifting relationships and multiple background factors that people bring to communication. This view strengthens the notion of L+N as generative, more than human and as having multiple potentialities (Burnett & Merchant, 2018). Burnett and Merchant explain that viewing contexts as entities

...highlights what might be possible; it provides a way of sensing what else might get produced if things are assembled in other ways; and hints at what is virtually there. It does this through an affective-reflective engagement with literate encounters. It may also help us better articulate and develop research methods that bring indeterminacy and affect into play, and that work with complexity rather than seeking to order it through linear accounts (p. 10)

This 'sociomaterial' way of viewing context represents a significant expansion in L+N theory that creates a space in which it is much easier for indigenous perspectives such as those expressed by Māori in *Te Kawai Ora: Reading the world, reading the word, being the word* (Māori Adult Literacy Working Party, 2001) to become part of the predominant way we enhance L+N in NZ and in the global project.

Finally, the purpose of literacy has been debated. The skills view tends to correlate with a work/economy focus whilst the social practices view tends to marry with the argument for a broader range of purposes, often expressed as everyday living (Papen, 2005). In NZ, Furness (2012) concluded that whilst social reasons for supporting literacy learning were expressed in official discourse, economic/work-related reasons predominated. The possibility of genuine application of principles such as the importance of context in learning and culturally appropriate pedagogy articulated in policy documents and outward-facing discourse (e.g. MoE, 2008; TEC, 2008) offered potential for a broader range of literacies valued by people to be supported. However, a 2017 review of adult literacy policy discourse in Aotearoa concluded that there was by now a narrowing of the official focus (Furness & Hunter, 2017).

We also note that many literacy and numeracy researchers have repeatedly emphasised, over many decades, the critical importance of providing, through the research approaches utilised, *detailed* accounts of *particular* situations in which literacy and numeracy are involved because of their power to reveal broader meanings, values and uses of literacy in peoples' everyday lives (c.f. Barton & Hamilton, 1998; Pahl, 2014). The qualitative component of our research will allow this to occur.

3 Narrowing it down: OECD's definition and measurement of skills

The quantitative component of this project focuses on using OECD's large-scale surveys of skills (in particular, PIAAC) to provide information on the prevalence of low L+N in NZ, and on the characteristics of those who are more likely to be living with low L+N. Therefore, this subsection provides more detailed information on OECD's large-scale adult skills assessment tools as well as the OECD's definitions of low L+N in this context.

3.1 Moving beyond qualification proxies: OECD's large-scale skills surveys

Prior to the large-scale assessments of adult skill levels, the OECD's approach to defining and measuring skills focussed on qualifications. It was thought that possessing at least lower secondary education¹ indicated basic proficiency in literacy and numeracy skills (Windisch, 2015, p. 21). The consensus that education was an important policy tool for achieving both economic and equity goals (discussed in more detail in Section 4.1) also derives, in part, from a large body of work demonstrating an enduring and powerful link between qualifications held and income earned. Despite this link, the returns from qualifications remain uneven across social groups (for example, women, ethnic minorities and migrants) and equal access to the education system remains a challenge. Moreover, while qualifications represent an easy proxy for skills, they do not capture information on the deployment and utilisation of skills in the workplace and society.

The advent of large-scale skills surveys (the International Adult Literacy Survey (IALS) and the subsequent Adult Literacy and Life Skills Survey (ALL) and PIAAC) made it possible to compare the resulting direct measures of skill with qualification levels. Although literacy proficiency measured by these surveys is strongly correlated with qualification level, there is considerable variation in the level of literacy proficiency shown by individuals with similar educational attainment (OECD, 2012a, 2019b). In fact, it appears that educational attainment and direct assessments measure different underlying constructs. For example, educational attainment and literacy proficiency each have an independent and positive impact on earnings (OECD, 2019c).

3.2 What is the PIAAC Survey of Adult Skills? An overview²

What are these large-scale cross-country skill surveys and how do they measure skills? PIAAC is the most recent OECD initiative to measure skills, and builds on similar earlier surveys (IALS, which was conducted in 20 countries between 1994 and 1998; and ALL, which was conducted between 2003 and 2008). These international comparative studies aim to provide participating countries, including NZ, with information about the skills of their adult populations. In particular, the PIAAC survey is designed

¹ That is, International Standard Classification of Education (ISCED) level 2.

² For more details about PIAAC's aims and design, see Kirsch et al. (2020).

to measure how much of a country's workforce has the cognitive skills needed to participate in society, and the workplace skills needed for economic prosperity.

PIAAC measures three domains of skill: literacy, numeracy and problem-solving skills in technology-rich environments. To date, the PIAAC has been administered in over 40 countries, including non-OECD partner countries such as the Russian Federation and Singapore (OECD, 2019c, p. 59). It is a representative survey of 16-65 year-olds involving about 5,000 respondents in each country. The study design is to run a cycle of the survey every ten years, with each cycle split into three rounds of data collection covering different countries. The first cycle was conducted between 2011 and 2018, with NZ participating in the second round in 2014. Round one of the second cycle is currently underway. Results from the first cycle are currently available. The results from the second cycle were expected to become available to researchers in 2023. However, the planned 2021 PIAAC collection has now been delayed due to Covid-19, which will delay data availability.

The PIAAC survey is overwhelmingly computer adaptive although a paper version is administered to participants who indicate they have no computer experience or who request it. The survey has been cross validated in terms of culture and language to facilitate cross-country comparisons. As a representative survey, it allows the exploration of the relationship between individual and household characteristics and L+N skills within NZ. The study also aims to capture meaningful changes in skill levels over time so countries can track their own progress and their progress relative to other participating countries over time. For more details of the design and key features of PIAAC, see Kirsch et al. (2020).

Formally, PIAAC has two overarching objectives. First, it aims to identify and measure differences within and across countries in:

...literacy competencies for the information age – the interest, attitude, and ability of individuals to access, manage, integrate, and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in the information age (OECD (2006) cited in PIAAC Numeracy Expert Group (2009, p. 7)).

Second, PIAAC seeks:

...to assess the relationship of adult competencies with economic and social outcomes believed to underlie both personal and societal success (e.g., earnings, employment, educational attainment, participation in further learning) and optionally with additional outcomes or processes at the individual level (e.g., health, social capital) or workplace level, and with transitions at key points over the lifespan, such as school-to-work and possibly other stages (PIAAC Numeracy Expert Group, 2009, p. 7).

PIAAC maintains links to IALS and ALL enabling some continuity with the preceding frameworks. Consequently, the OECD design of PIAAC required that 60% of the numeracy and literacy tasks were drawn from the item pool used in IALS and ALL (Kirsch et al., 2020). This is particularly important for those countries that have participated in multiple surveys, including NZ, as it enables them to capitalise on their previous assessments as well as allowing them to develop some sense of how adult competencies have changed between assessments (PIAAC Numeracy Expert Group, 2009).

3.3 What does PIAAC assess?

PIAAC sets out to assess three main skill domains (OECD, 2013b, p. 2):

- Literacy (including reading components)
- Numeracy
- Problem solving in technology-rich environments (PSTRE)

Each of these domains was considered by OECD expert groups (PIAAC Expert Group PSTRE, 2009; PIAAC Literacy Expert Group, 2009; PIAAC Numeracy Expert Group, 2009) who sought to find definitions of each domain that considered both existing definitions and the purposes of PIAAC. For example, the PIAAC Literacy Expert Group adopted the following definition, which is similar to the IALS/ALL definition:

Literacy is understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential (PIAAC Literacy Expert Group, 2009, p. 8).

This definition does not focus on the capacity to write or produce texts - abilities which often feature in definitions of literacy. It is also a broader construct than "reading", narrowly conceived as a set of strategies for decoding written text. Rather, PIAAC literacy is intended to cover a variety of cognitive strategies employed by adults to respond appropriately to a range of texts across a number of different formats and types in the situations or contexts in which they read (OECD, 2013b).

Similarly, the definition of numeracy adopted by the PIAAC Numeracy Expert Group emphasises that competencies are to be conceptualised as internal mental structures. That is, abilities, capacities or dispositions embedded in the individual (PIAAC Numeracy Expert Group, 2009, p. 21):

Each competence is built on a combination of interrelated cognitive and practical skills, knowledge (including tacit knowledge), motivation, value orientation, attitudes, emotions, and other social and behavioural components that together can be mobilised for effective action. Although cognitive skills and the knowledge base are critical elements, it is important not to restrict attention to these components of a competence, but to include other aspects such as motivation and value orientation (OECD, 2002, pp. 8-9).

The PIAAC definition of numeracy was, however, considered inadequate on its own as numeracy is a broad multidimensional construct referring to a complex competency that needs to be coupled with a more detailed definition of numerate behaviour (PIAAC Numeracy Expert Group, 2009). This is captured in the adoption of a supporting definition of numerate behaviour as:

Numerate Behaviour involves managing a situation or solving a problem in a real context, by responding to mathematical content/information/ideas represented in multiple ways (PIAAC Numeracy Expert Group, 2009, p. 21).

The final domain included in PIAAC is Problem Solving in Technology-Rich Environments (PSTRE). This domain has two main aims: "analysing the problem solving skills involved in the uses of digital technologies for various purposes and properly assessing the distribution of such skills in the general public" (PIAAC Expert Group PSTRE, 2009, p. 6). The definition adopted was:

PSRTE involves using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks. The first PIAAC problem solving survey will focus on the abilities to solve problems for personal,

work and civic purposes by setting up appropriate goals and plans, accessing and making use of information through computers and computer networks (PIAAC Expert Group PSTRE, 2009, p. 9).

This project will focus on the literacy and numeracy domains of PIAAC. There are several potential issues with using PSTRE to undertake quantitative analysis of skills. First, the PSTRE component of PIAAC was administered to a non-random subset of participants who completed the computer-adaptive version. Those that completed the paper version did not complete the PSTRE module. Moreover, what constitutes a technology-rich environment changes over time. For example, while in principle the definition of PSTRE recognises that a proper assessment of PSTRE would not be limited to traditional desktop computer, but encompass mobile and integrated technologies, the assessment of PSTRE in PIAAC was, for pragmatic reasons, limited to problems requiring the use of computers and internet services (PIAAC Expert Group PSTRE, 2009, pp. 10-11). However, computers are becoming less relevant over time relative to mobile and integrated technologies.

3.4 How does PIAAC define low L+N?

PIAAC defines those with 'low skills' in terms of the proficiency score that the individual achieves. Those scoring at or below Level 1 on the PIAAC literacy and numeracy scales are considered to have low skill levels (Grotlüschen et al., 2016). Individuals with literacy proficiency below Level 1 (which equates to a proficiency score below 176) can read:

... brief texts on familiar topics and locate a single piece of specific information identical in form to information in the question or directive. They are not required to understand the structure of sentences or paragraphs and only basic vocabulary knowledge is required. Tasks below Level 1 do not make use of any features specific to digital texts. (OECD, 2013b, p. 67)

A person with Level 1 literacy (a proficiency score of between 176 and 226) can:

...read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information, which is identical to or synonymous with the information given in the question or directive. These texts contain little competing information. Adults performing at this level can complete simple forms, understand basic vocabulary, determine the meaning of sentences, and read continuous texts with a degree of fluency. (OECD, 2013b, p. 67)

Similarly, those with numeracy below Level 1 (a proficiency score of less than 176):

...can only cope with very simple tasks set in concrete, familiar contexts where the mathematical content is explicit and that require only simple processes such as counting; sorting; performing basic arithmetic operations with whole numbers or money, or recognising common spatial representations. (OECD, 2013b, p. 79)

And those with Level 1 numeracy (a proficiency score of between 176 and 226) can:

...complete tasks involving basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. They can perform one-step or simple processes involving counting, sorting, basic arithmetic

operations, understanding simple percentages, and locating and identifying elements of simple or common graphical or spatial representations. (OECD, 2013b, p. 79).

For comparison, Level 2 literacy (a score of 226 to 275) requires “respondents to make matches between text and information, and may require paraphrase or low-level inferences” (OECD, 2013a, p. 6). Level 2 numeracy requires “the respondent to identify and act upon mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors” (OECD, 2013a, p. 11).

The earlier IALS and ALL surveys used similar proficiency score systems. However, the proficiency scales and definition of low skills were different. In IALS and ALLS, those who achieved Levels 1 or 2 were defined as having low literacy and numeracy; level 3 was considered essential for adults to ‘function’ in a knowledge society.

Another relevant L+N measurement tool is NZ’s Literacy and Numeracy for Adults Assessment Tool (LNAAT). This tool was developed by the NZ Council for Educational Research on behalf of the Tertiary Education Commission (TEC). This project will use LNAAT results in analysis of L+N interventions in NZ. LNAAT is widely used in lower-level tertiary education, schools and other settings. The Assessment Tool is designed to show what individuals need to learn to improve their skills. Assessments are conducted in a wide range of contexts, including homes, classrooms, assessment centres and prisons. A relevant distinction between LNAAT and PIAAC is that LNAAT is an assessment tool whereas the PIAAC is a survey and participants are chosen to ensure it is representative of the NZ adult population aged 16 to 65 years. However, there is an approximate mapping between LNAAT and PIAAC levels. Those who score at Step 1 on LNAAT for reading are likely to score at or below Level 1 on PIAAC. Those who score at Step 1 or 2 for numeracy in LNAAT are likely to only score below level 1 for numeracy in PIAAC (MoE, 2019a).

3.5 Critiques of the OECD approach: A call for a mixed-methods approach

The OECD has contributed to the development of skills policies in its member nations in ways that have been beneficial to them as they adapt to a changing world and prepare for an even more rapidly changing future (Black & Yasukawa, 2016). This project is built around PIAAC because its usefulness to Aotearoa NZ in achieving our economic and social goals is realised and appreciated by policymakers and practitioners alike.

However, it is essential that the research does not rest on an uncritical positioning of the foundations of OECD’s skills development-related work. Each nation must fully understand its own particularities, and draw on and contribute to the collaborative OECD effort according to its own aspirations in order to maintain the appropriateness for its citizens of its perhaps aligned, but nevertheless independent, skills development activities. This approach is in keeping with the value position of the OECD itself. On this basis, we offer a range of perspectives on aspects of the OECD’s work. The primary purpose is to bring these differing perspectives into the ongoing interrogation of skills development in Aotearoa NZ in which the project engages. The critiques offered here arise from differing viewpoints on what literacy is and the purposes it serves in society, and from the association of particular views of literacy with particular research approaches.

The first point to make is that the view of literacy that takes centre stage in many OECD nations, many of which are so-called “western nations” like Aotearoa NZ, is a skills-focused view. Although the socially

constructed and context-specific nature of skill is acknowledged as we have seen in Section 2.1, and despite the evidence of the same in relation to L+N as we saw in Section 2.3, literacy is still attended to predominantly by governments in OECD nations as if it is isolable skills (Gee, 2008). Three broad problem areas are noted here. The first is the tendency for universalism (despite efforts to the contrary) and thus local irrelevance. The second is the partiality of the notion of literacy and numeracy used in international tests in comparison to the diversity of literacies used by people in their lives. Relatedly, a third concern is the marginalising effect on other literacies and those who use them, of reifying a particular set of skills.

Related to the first concern, it is important to note the highly valued work undertaken by the OECD using its policy tools such as the OECD Skills Strategy. The OECD uses these tools to provide general policy advice underpinned by evidence including evidence from PIAAC and other skills surveys and cross-country experiences. In this way, their country-specific policy advice is tailored to circumstances and institutions. Further it is undoubtedly beneficial for countries to be able to look to the OECD for best practice policies based on the experience of multiple country contexts. However, many distinguished literacy researchers (e.g., Street 1998; Hamilton & Barton 2000) critique the dominant role of the OECD in national adult L+N policy-making identifying “the failure of international surveys to properly account in a meaningful way for how L+N practices are used in local sites” (Black & Yasukawa, 2016, p. 169). They espouse that the standardisations and normalisations that occur in policy built on mass surveys across numerous and vastly different nations, reduced to manageable chunks, cannot match the authenticity of localised experiences.

For example, localised, often ethnographic studies, have demonstrated the various ways workers across a range of industries and community sites actually use literacy and numeracy in their work (Gee et al., 1996; Belfiore et al., 2004). These may be invisible to the workers themselves (Hoyles et al., 2010). Further, citing Black et al. (2013, 2015), Black and Yasukawa (2016) have found that job performance can be proficient irrespective of English language-based literacy and numeracy levels in some contexts which therefore have little bearing on productivity. Whilst Hamilton and Barton (2000) understood the IALS designers had attempted to improve the test’s validity by developing items around real contexts or documents, the requirement to massage items to fit the wide-ranging particularities of the different OECD countries rendered the items, in the end, they believed, universalistic and thus potentially meaningless in particular countries. The same design features carried over into PIAAC thus this particular critique is also likely to apply to OECD’s latest skills survey.

The second concern expressed by Hamilton and Barton (2000) was that the definitions used in the IALS represented only a partial view of what literacy is. In their view, IALS results were therefore not a useful and reliable means of understanding L+N ability that were in any way meaningful to people. We are reminded that the dominant literacies and ways with literacy are not those of everyone. Those appearing via a test to be low skilled are viewed as inferior and deficient irrespective of how highly skilled they may be in their uses of literacy in the full range of contexts of their daily lives or in other literacies. In reifying one form of literacy, other literacies are marginalised along with their users. This, then, is a problem of exclusion and disadvantage for certain people and certain groups, systemically created by the exclusivity surrounding the dominant literacy.

Whilst the OECD has strived to render subsequent surveys more country-relevant, they remain focused on what is actually a restricted form of literacy in a narrow range of contrived settings (Hamilton & Barton, 2000). This is a critical point in the context of this research. As we have pointed out in Section 2, there are many literacies and different literacies are important in different contexts. We know that for Māori, the dominant literacy is valued in some circumstances such as participating in mainstream society, and so is literacy as Māori would define it, which includes reading Māori and other worlds as

well as literacy in both the English language and te reo Māori (Māori Adult Literacy Working Party, 2001).

Finally, the binary distinction that is often made between quantitative and qualitative research in which quantitative research is given more weight is considered by many literacy researchers to be an anathema to a full understanding and useful measuring of literacy abilities. Luke (2010) observes that “qualitative ‘critical work’ is portrayed as scientifically soft, politically correct and ideological by the press, politicians and the educational bureaucrats... (whilst)... empirical, quantitative scientific research is presented as unbiased, truthful and the sole grounds for rational policy formulation” (p. 178). He favours instead, “a broad, rich, multidisciplinary, quantitative and qualitative, generalizable and local canvas of research data and findings” (p. 179) to inform policy. This is consistent with the approach being taken in this project, which incorporates both quantitative and qualitative research to provide richer insights into L+N skills within the context of NZ.

4 Why skills matter: The relationship between skills and outcomes

While there is controversy over what constitutes ‘skills’, there is a broad consensus that lifting skill levels at individual and societal levels leads to improved economic and social outcomes. This premise is underpinned by Human Capital Theory, which argues that investment in education and skills leads to greater productivity, resulting in higher earnings for the individual as well as boosting the strength of the economy (Marginson, 1993, 1997; Piercy, 1999). This section discusses how important skills are considered to be by policymakers for meeting economic and social equity goals, with a focus on the OECD. It then briefly examines the evidence behind this policy focus on skills development.

As discussed in Section 2, there are differing views on what is meant by the term skills, and literacy and numeracy. It is, therefore, important to note the studies cited below often use a particular definition and measurement approach. For example, many of the cited studies look at the link between the PIAAC proficiency scores and country- or individual-level outcomes, such as income. While these measures have limitations (see Subsection 3.5), they provide a means for investigating how low literacy and/or numeracy may impede the broad objectives of individuals, communities or societies.

It is also noteworthy that while the evidence is divided into economic outcomes, with a focus on incomes, and broader wellbeing and equity goals for convenience, this distinction is arbitrary as the different outcomes influence each other. Moreover, many argue that it is essential that we embrace the well-researched view that literacy contributes to society in complex and interrelated ways that need to be understood if we are to maximise its potential to enhance all people’s lives (Graff & Duffy, 2008).

4.1 Skills as a central policy tool for achieving economic growth, wellbeing and equity goals

The OECD has maintained a long-standing emphasis on skills development, and, a wealth of relevant research and policy discussion exists. This is reflected in the OECD’s inclusive growth framework, where education is a key part of the goal of contributing to economic growth as well as tackling inequalities by establishing equal opportunities for all (for example, see OECD, 2018).

Another important programme developed alongside the inclusive growth framework is the OECD’s Better Life Initiative, which addresses “concerns...regarding the fact that macroeconomic statistics, such as GDP, don’t provide a sufficiently detailed picture of the living conditions that ordinary people experience” (OECD, 2020b). The Better Life Initiative and the related work programme on measuring wellbeing and progress stems from concerns over the ways in which social and economic gains have slowed, or even reduced on some dimensions, in member countries (OCED, 2020b).

One of the policy tools the OECD has shared with its member countries is the Better Life Index. The Better Life Index is a collection of social indicators countries can use to develop their own ways to measure their individual progress towards wellbeing. The OECD (2020a) also collates data using the index, the results of which are published in the *How’s Life* reports. Skills and education are emphasised within the Better Life Initiative as important indicators to measure and understand demonstrating the important links between skill levels and wellbeing (for example see OCED, 2017a). In considering

wellbeing, the Better Life Index states that that “education plays a key role in providing individuals with the knowledge, skills and competencies needed to participate effectively in society and in the economy”, highlighting that access to education can improve health, civic participation and happiness (OECD, 2020b).

In a similar vein to the inclusive growth framework and the Better Life Initiative, the NZ Treasury (2018) developed a Living Standards Framework (LSF) that also places emphasis on education and skills. It includes ‘Human capital’ as one of its four capitals, alongside natural, social and financial/physical capital. It uses a broad definition of human capital as the “capabilities and capacities of people to engage in work, study, recreation, and social activities” and states that it includes “skills, knowledge, physical and mental health” (Treasury, 2018). As with the OECD’s Better Life index, this LSF was borne out of concerns about wellbeing and equality, and the desire to pay greater attention to the interactions between financial/physical, natural, social and human capital. By seeking to understand and measure these forms of capital, it becomes more possible to identify trends that signal the prevalence of low L+N (at least of certain kinds) in a population and investigate ways in which low L+N may impede the broad objectives of individuals and society.

As discussed in Section 2 on defining skill, the policy discussion reflected in the Better Life Index and the LSF is attempting to move beyond simply counting qualifications. In doing so these approaches also capture the growing realisation of the complex and interrelated nature of skill formation that needs to be taken into account when developing policies to deliver on social and economic goals

Although the measurement of skills illustrated in PIAAC draws on literacy development outside of the formal education system and the attainment of qualifications, much of the policy advice remains focussed on formal education. Indeed, the complex nature of skill formation has tended to be downplayed in skills strategies in NZ and other OECD countries. Even in NZ’s adult education sector, tightly bounded and targeted solutions to perceived skill development needs have been favoured by successive governments, which may at least partly reflect that this approach makes it easier to allocate funding and monitor compliance to the funding rules. In contrast, the adult education sector has often expressed preference for funding mechanisms that allow for varied, flexible and multi-layered teaching and learning arrangements. This preference is based on the sectors’ experiential knowledge of teaching adults as well as the extensive body of research evidence on effective adult learning pedagogy (Benseman & Sutton, 2008).

Overall, while the policy discussion is increasingly recognising that tightly bound programmes in adult education, and the gaining of qualifications in the broader education system, does not adequately account for the complexity of skill formation, the delivery of programmes remains focussed on these elements. Indeed, it is still the case that the terms ‘education’ and ‘skills’ are often used interchangeably in the sense that more education is assumed to lead to greater skills. However, there is increasing recognition that this link is not automatically guaranteed. For example, while one might expect that the vast majority of young adults with university qualifications would perform well in PIAAC (levels 4 and 5), a sizeable minority do not – in several countries, more than a fifth of young graduates have L+N skills below level 3 (Kuczera et al., 2016). Moreover, countries with similar average years of schooling have very different levels of skills in the population. For example, analysis of large-scale surveys such as PIAAC has shown that the skill deficits in developing countries are much larger than those suggested by just school enrolment and attainment (for example, see Hanushek & Woessman, 2008).

4.2 What is the quantitative evidence that skills matter to economic outcomes?

What is the evidence behind this emphasis by policy making and advisory organisations on education and skills as a way to achieve both economic and social equity goals? We turn first to the evidence on the link between skills and economic outcomes, from the perspective of a country overall, as well as that of the individual.

As mentioned, the link between qualification level and income is well established. At the country level, higher average education levels are associated with higher GDP per capita (see, for example, Hanushek & Woessmann, 2010; OECD, 2012b). Moreover, at the individual level within a country, those with higher education levels have, on average, higher employment rates and earnings (see, for example, Education Counts, 2020b; Wolbers, 2000). This subsection, therefore, focuses on the evidence of the link between skills and income. Given that skills surveys are the main tool allowing for large-scale, representation of skills in the population, by necessity, this review focuses on studies using these measures.

Looking across countries, using the Trends in International Mathematics and Science Study (TIMSS), Programme for International Student Assessment (PISA) and IALS surveys, Hanushek & Woessmann (2008) find strong evidence that high L+N within a country is positively related to individual earnings, a more equal distribution of income, and rates of economic growth. These positive relationships also exist when using traditional measures of skill, such as years of schooling and the stock of educational qualifications, but effects are more pronounced when using L+N skills. Thus, both cognitive skills and qualifications tend to have positive, but separate, effects on economic outcomes. Notably, skill deficits across countries are significantly more pronounced when using L+N as opposed to traditional educational attainment measures. These relationships also indicate that using L+N measures may be more efficacious in capturing the differences than more blunt measures such as qualification stocks. The authors suggest that efforts to reduce inequality between countries may be better served by focusing on improving skills rather than increasing the stock of postsecondary degrees, for example. The authors posit that this refocusing would require major restructuring of many educational institutions.

Turning to within-country studies, analysing results from a 1970 longitudinal birth cohort study in Britain, Ekinsmyth & Bynner (1994) find that those testing in the bottom quintile in terms of L+N as children were less likely to obtain qualifications, despite staying longer in secondary school, and were less likely to secure employment after leaving school. Male school leavers with low L+N skills spent more time in training that frequently did not lead to employment. Female school leavers with L+N skills spent more time in school and were more likely to exit without qualifications in order to raise children. While other factors, such as parent occupation and family income, also explained a significant amount of variation in early-career occupational outcomes, L+N skills remained an important factor even after controlling for these additional characteristics. Overall, the study highlights the importance of L+N skills in improving the likelihood of obtaining qualifications and in improving labour market outcomes.

This finding is also supported by other studies, including McIntosh & Vignoles (2001). This study uses UK IALS data to examine the effect of having low skill levels (i.e., level 1 or below on the IALS proficiency scale) on wages. It finds large returns to skills (i.e., higher hourly earnings), with those with above level 1 literacy earning, on average, 16% more than those with level 1 or below literacy, and those with above level 1 numeracy earning 21% more. These effects for numeracy tend to be smaller when additional factors are controlled for, suggesting there are other important channels that affect wages beyond

skills. For example, including parental education, social class and family financial difficulties when the respondent was aged seven, the wage premium for skills increases for literacy but decreases for numeracy (19% and 12% respectively). When highest educational qualification is also included, the premium reduces to 12% for literacy and 7% for numeracy, and the estimate for numeracy is no longer statistically significant. This again suggests that a benefit of higher L+N skills is that it improves access to, and completion of, qualifications, although there is a separate, significant return to higher literacy and numeracy.

Using results for the 23 countries that participated in the first cycle of PIAAC, Hanushek et al. (2015) find that a one standard deviation increase in the literacy proficiency score increases wages of prime age (35-54 years) by 17%. Likewise, a one standard deviation increase in the numeracy score³ increases wages by 18%. It is unsurprising that the literacy and numeracy results are so similar given the correlation between the literacy and numeracy proficiency scores is very high (0.87). When years of schooling is controlled for, the return to skills drops but remains substantial – for example, the return to numeracy falls to 10%. The results also vary by country - ranging from 12-15% in the Nordic countries to 28% in the United States (Hanushek et. al., 2015).

NZ was not in the first cycle of PIAAC and so is not included in Hanushek et al. (2015), however, NZ estimates are being undertaken in the current project. The general finding of a positive relationship between L+N and earnings is also consistent with previous NZ and international research showing that the low-skilled population are more likely to be unemployed or to receive welfare, have low income and be wage earning rather than on a salary or self-employed (Giesecke et al., 2015; Satherley, 2017). These characteristics can increase the gap between skill levels over time, as people pick up skills in employment. Individuals pick up a greater skillset from jobs with higher skills requirements which are not filled by low-skilled individuals, and as average education levels grow, the wage premium associated with this increases too, heightening the earnings inequality between low-skilled and high-skilled labour (Giesecke et. al., 2015).

Although there is evidence of the link between literacy and employment and earnings, the evidence that interventions aimed at improving L+N skills improve these outcomes is less clear cut. For example, a study on *Skills for Life*, a government initiative to improve adult L+N in England (Meadows & Metcalf, 2008) found no statistically significant difference in employment status, earnings or job satisfaction between programme learners and non-learners in the first year after participation. However, this contrasts with the perceptions of the *Skills for Life* participants, with almost a quarter believing that the course had resulted in employment benefits, including increased job performance and/or gaining a better job.

Moreover, the employment effects were only analysed one year after participation in a course. It may be that the impact takes longer than one year to be detectable. In addition, other positive changes among participants were seen, such as greater positivity towards further education and training and improvements in self-esteem. This highlights that increasing L+N skills has the potential to improve facets of an individuals' wellbeing beyond labour market outcomes. Planned work within the current project includes examining the outcomes of those who participated in L+N programmes in NZ both in the short- and medium-term, including outcomes such as employment, earnings, benefit receipt, further education and training, justice sector interactions and health.

⁴ One standard deviation increase is approximately 50 points, which is about the difference of one PIAAC level, for example an increase from level 1 to 2.

4.3 What is the quantitative evidence that skills matter to broader wellbeing goals?

As discussed, skills matter not only to income, but also to wellbeing more generally. The distinction between income and wellbeing is made for convenience, but is arbitrary as the outcomes are related. This is also acknowledged in policy discussions, such as within the LSF where the four capitals are interdependent. As a specific example, higher skills can improve health, and improved health increases earning potential, and increased income in turn, improves health outcomes. Moreover, countries with higher skill levels also tend to have lower levels of income inequality, which is consistent with inclusive growth (Hanushek & Woessmann, 2008).

Evidence from PIAAC highlights the positive relationship between skills and several wellbeing outcomes. People with higher skills and education have higher levels of self-reported health, volunteer more often, trust others more and feel that they have more political voice (Scott, 2018). In NZ, the difference in self-reported health between those with the lowest and highest level of education and literacy is 22 percentage points, which is less than the OECD average of 33 percentage points (Scott, 2018).

There are several studies documenting the positive relationship between skill levels and health outcomes, with the majority focussing on literacy. Low literacy individuals are more likely to report poorer health status and are at higher risk of suffering from diabetes and heart failure (DeWalt et al., 2004). However, the relationship between skills and health is complicated, as it is likely confounded by a number of factors, such as lower incomes or being employed in higher risk occupations. One way in which lower skill levels could directly impact on health outcomes is via difficulties following medication instructions. Several studies find that those with low literacy have lower medical compliance, such as taking medications as directed or logging medical information (such as glucose levels for diabetic patients) appropriately (see Marcus, 2006; Reyna et al., 2009 for example).

Not only is there an association between low literacy and lower physical health, but there is evidence of a link to poorer mental health. Wolf et al. (2005) find that low literacy is associated with poorer mental health as well as physical function, and such individuals are more likely to report having difficulties with essential activities of daily living. These impediments to good health make low literacy patients costlier to treat. Not only are their costs higher overall, so their average emergency room costs and inpatient costs are as well (Howard et al., 2005).

There are a small number of studies that examine how numeracy affects health outcomes. Nelson et al. (2008) find that low numeracy patients require a greater amount of explanation regarding relevant risks in order to engage in preventative behaviours. This is concerning as prevention of some of the major causes of death, such as cardiovascular disease and cancer, require taking immediate actions and those with low numeracy have higher discount rates. Put succinctly, “[l]ow numeracy distorts perceptions of risks and benefits of screening, reduces medical compliance [and] impedes access to treatments” (Reyna et al., 2009, p. 943).

The 2014 PIAAC prison study also highlights the relationship between low skill levels and the probability of offending. This is the strongest for young (68% of offenders in the OECD with low skills) men (94% of the offenders in the OECD) with low skills. Half of all prison inmates had left high school early and 35% had parents who left high school early (at the time of the survey). Low levels of education mean lower labour market opportunities and a lower opportunity cost of committing crime. Committing a crime can also have a rippling effect on skills – those who had been to prison had their hourly wage reduced

by 26% - which gives less opportunity to build their skills in work. However, if they are able to build skills in prison, they will be less likely to reoffend (Patterson, 2018).

Low L+N can also negatively affect everyday activities. Adults with low skills are also less likely to engage in financial activities such as reading bills, invoices, bank statements, budgeting or even completing transactions via the internet. Those with low skills are less likely to budget, as well as more likely to have low incomes, which can cause stress and financial instability (Satherley, 2017).

In sum, the research suggests that low L+N is associated with a number of poor social outcomes and economic harm. Further, Roman (2004) finds that issues associated with low literacy, such as shame and frustration, social isolation, poverty and unemployment, and poor health, only worsen with age. This highlights the importance of better understanding the complex landscape of low literacy and numeracy in NZ to help combat these negative consequences more effectively.

4.4 What is the qualitative evidence that skills matter to outcomes?

The quantitative studies discussed above reinforce the positive relationships between higher L+N skills and a number of outcomes. In order to understand what might underpin the changes in correlation or relationship strength, or why the positive relationship is not always captured when diverse experiences are taken into account, it is important to also consider qualitative research.

Qualitative studies have provided insight into the complexities of L+N as a field of study and the nuances of L+N learning in terms of antecedents and outcomes. We now address three important dimensions of the contribution qualitative studies make to understanding low skills. The first is to illuminate the multiple ways in which people use L+N in their lives that are of value to them regardless of any official measure of their L+N skills. The second is to illuminate the aforementioned complexities which need to be taken into account when considering people's engagement in learning opportunities. The third is the breadth and scale of positive outcomes that are identified when a broader social practice view of L+N is applied in studies of low-skill interventions, as is typically the case in qualitative research.

A number of classic ethnographic and other qualitative studies have demonstrated, over the last 40 years, the ways in which people acquire and use L+N in their lives. These include Heath's 1983 study *Ways with words: Language, life and work in communities and classrooms*, Street's 1984 study *Literacy and theory in practice* and Barton and Hamilton's, 1998 *Local Literacies: Reading and Writing in one community*. Evidence of this phenomenon continues to accrue through more recent works such as Pahl's 2014 *Material literacies in communities*. These works dispel what Graff and Duffy (2008) have called the 'literacy myths' including that economic progress for individuals and societies is not possible without literacy and that people without those literacies valued by the dominant institutions in a society are deficient. Qualitative studies, where close attention is paid to the details of people's nuanced lives over time, have provided rich, 'thick' descriptions of the many, varied and complex ways people use literacy in their lives. Such studies also dispel the idea that literacy is a singular thing (a set of skills used in the dominant institutions). They have also demonstrated the multiple meanings literacy has for people and for societies, as well as the many forms or modes of literacy.

In setting out key literature dealing with the complexities in understanding the impact of low skills, we begin with Barton's (2009) synthesis of a set of studies which explored the relationship between learners' lives and LLN (literacy, language and numeracy) learning in the UK. The main research study

at the heart of this synthesis involved 134 adult learners in community-based programmes and 148 teachers/tutors, managers and support people. The Skills for Life programmes these learners were participating in took place within a drug support and aftercare centre, a young homeless project and a domestic violence project. The programmes were thereby offering learning support for adults who are often among the most marginalised in society – the so-called ‘hard to reach’ learners (Barton et al., 2006, cited in Barton, 2009) – and doing so in learning contexts relevant to their lives at the point in time they became involved.

In this synthesis, numeracy and language were seen as “activities that people carry out and which relate to and are shaped by all the other activities they engage in throughout their lives, rather than just as skills or cognitive attributes that people have or do not have” (p. 5). Thus, literacy in this study was seen from a sociocultural perspective – as social practice. By examining the findings in this study in light of others in the set, Barton was able to demonstrate the common, repeated findings that came from a broad range of LLN studies with different methodologies. Barton found that many of the hardest to reach learners had

- highly developed skills and competencies
- negative educational experiences
- experience of living with ill health, past and present, and bullying
- different reasons (motivations) for being involved
- a range of constraints
- feelings and emotions that shaped their learning
- a range of aspirations
- many roles and responsibilities and commitments
- shifting priorities and circumstances, and that many
- carried histories of violence and trauma (pp. 7-8)

This points to complex factors that may be present and have a bearing on adults’ participation and engagement in literacy and numeracy learning. In examining these findings in light of other studies, Barton identified four overlapping and interactive aspects of their lives that people bring to the settings in which they engage in literacy and numeracy learning: “their histories, their current identities, their current life circumstances, and their imagined futures” (p. 25).

Similar findings about learners are articulated in Furness’s (2013) in-depth, semi-longitudinal NZ study of wellbeing effects of adults’ participation in whānau (family) literacy programmes. Nineteen mainly Māori, Pacific and Pākehā adults in four whānau literacy programmes were followed over 18 months, participating in 79 repeated conversational interviews. The research involved 54 days of site visits, twelve programme observations and analysis of programme documentation. The study identified six characteristics of the programmes related to people and six related to literacy. Relevant here are three of the people-focused characteristics to which programme staff responded. First, programme staff recognised that adult learners already have ‘skills and talents’ that they use in their daily lives and that they already make important contributions through these skills and talents to their families and communities. Second, they recognised that the adult learners were multifaceted: they had already

existing lives and these lives were already very busy and often complex and some people had multiple problems they were dealing with.

Thirdly, they recognised that people are cultural beings – they have different ways of being (beliefs, values and behaviours) (Gee, 2008), and these different ways of being are connected to their identities. An overarching characteristic of the programmes was interconnectedness; programme effects arose from a synergistic coming together of programme principles and practices, participants' circumstances and sociocultural histories, and their current experiences and circumstances beyond the programme. These were found to lead to personalised pathways that were idiosyncratic but nevertheless tangible. This study is important for its local context and the broad similarities its findings bear to Barton's (2009) research.

It is important to emphasise, however, that highlighting the complexities involved in adults' engagement with L+N does not discount the importance of L+N skills in achieving economic and social outcomes, many examples of which are located in or can be located through, both studies presented here. Most importantly given the bi-cultural character of the Aotearoa New Zealand context, studies of Māori experiences and outcomes of L+N learning, particularly in relation to culturally-based values and aspirations held for themselves, their whānau and their communities, provide critical information. For example *He Whānau Mātau, He Whānau Ora: Māori adult literacy and whānau transformation* (Potter et al, 2011) provides evidence of L+N learning that was important to the Māori adults who participated, the ways it made a difference to themselves, their whānau and their communities and why these changes were important to them as whānau and community members and as Māori.

To round off our literature review we note that many L+N researchers have repeatedly emphasised, over many decades, the critical importance of providing, through the research approaches utilised, detailed accounts of particular situations in which literacy and numeracy are involved because of their power to reveal broader meanings, values and uses of literacy in peoples' everyday lives (c.f. Barton, 1998). As Hamilton & Barton (2000) summarise:

there are different literacy practices in different domains of social life, such as education, religion, workplaces, public services, families, community activities; they change over time and these different literacies are supported and shaped by the different institutions and social relationships ... Research that purports to increase understanding of literacy in society must take account of these meanings, values and uses – and indeed they are the source of the ideas which statisticians use to interpret their findings (p. 379).

5 The Aotearoa New Zealand context

This section focuses specifically on Aotearoa NZ. It describes the particular contextual features that characterise NZ and also describes different viewpoints on the local relevance of our approach to L+N skills as currently understood.

This section builds on several key points raised in the preceding sections. The first is the importance of skills for both a robust economy and for social equity, a viewpoint expressed by the OECD and consistent with the Treasury's LSF (OECD 2013, Treasury, 2018). This theme has run through skills strategies in NZ over at least the last 20 years and has been at the heart of debates in this country about the appropriateness, relevance and justness of the local approaches.

This section focuses specifically on Aotearoa New Zealand. It begins by presenting a Māori perspective on skills in the context of the historic and ongoing colonisation experienced by Māori. Pasifika experience is then presented.

5.1 NZ's unique bi-cultural context and legacy of colonisation

New Zealanders pride themselves on having a system whereby social mobility is accessible to anyone who works hard and obtains a modicum level of education. However, educational outcomes themselves are strongly linked to socioeconomic background in NZ, more so than in many other OECD countries (e.g., OECD, 2019b). Despite this, the belief towards social mobility remains and thus is reinforced within education attainment expectations. This section discusses the imported relevance of L+N to the NZ context and how such structures have reinforced colonial values that continue to direct Māori towards low-skilled and low-wage jobs.

The adage that "history is written by the victor" is particularly salient when the narratives of a primarily oral culture are subsumed within a written history of another. Māori have oral narratives passed through the generations that have been reinterpreted and written from the colonists' perspective. Such histories have been written in ways that contribute to the denigration of Māori in the lands that they have called home since around the 12th Century. At a time when European sailors were hugging the shores of their coastline for fear of falling off the edge of the world, Polynesians were navigating the vastness of the Pacific Ocean. Their discovery of Aotearoa was not fortuitous; it was the result of a series of long ocean voyages with the intended purpose of settling on different islands (Tuaupiki, 2017a). Their confidence and competence on the open ocean at such a time (Tuaupiki, 2017b) was unfathomable, and thus repeat return journeys that were recorded in songs and oral histories were re-depicted by early Pākehā settlers as a people lost and starving at sea, who stumbled across the "land of the long white cloud".

To appropriately reframe the original statement, New Zealand's history has been written by the coloniser, with Māori cast as savage, uncivilised, primitive, simple, practical minded or 'hands-on' and not university material. This deficit thinking pervades Aotearoa today and fails to recognise 600+ years of Māori knowledge, skills, experiences, sciences, medicines, craftsmanship, arts, voyaging, performing arts, environmental sustainability, oratory, knowledge transmission, law, warfare, governance, and social hierarchies that illustrate Māori expertise.

Māori did not one day wake up with amnesia, having “forgotten” who they were and what knowledge base they had. Such history, knowledge and social systems were actively dismantled by early British missionaries, traders and settlers. This included the introduction of diseases to which Māori had no previous exposure to develop immunity; the active displacement of a barter system for a monetary economy; the introduction of the Westminster governance system and legislation that favoured Pākehā and overpowered hapū and tribal governance structures (eg. Loan Act, 1863; Native Land Act, 1863; New Zealand Settlement Act, 1863; Native Schools Act, 1867; Tohunga Suppression Act, 1907); the early and ongoing transgressions of the 1840 Treaty of Waitangi; the scandalous removal of Māori lands through dubious deals and illegal confiscation; and the continuous onslaught against Māori knowledge, health, wellbeing, social structures, language and economic endeavours, that have all contributed to a seriously depressed group (Groot et al., 2017; King, 2003; McIntosh & Mulholland, 2011; Mulholland, 2006; Orange, 1987; Reid & Robson, 2007).

As a result, the processes of colonisation over 200 years has ensured a system of assimilating Māori as civilised British subjects and forcefully dislocating Māori from their traditions, cultural structures and knowledge. This historical trauma continues to resonate through today’s generations and shapes the marginalised state of Māori education, employment, health, life expectancy, incarceration, mental health, substance abuse, racism and discrimination, poverty and homelessness within a Pākehā dominated society.

As a result New Zealand has a seriously underserved population and the disparities experienced by Māori, that are often blamed on lifestyle diseases and individual choice and excess, give little regard to the structural inequities that are directly attributed to the long-term impacts of the social determinants of health and colonisation (Hodgetts et al., 2016). Recognition of New Zealand’s unique bicultural commitment to maintaining its partnership relationship (Metais, 2002, p. 11) remains. This means that a response to Māori flourishing in the future must be culturally located and collectively orientated. Māori flourishing must take into account the physical and social settings in which we conduct our everyday lives (Hodgetts, Drew, et al., 2010). A holistic and relational approach to health and wellbeing emphasises the collective unit over the independent person (Durie, 2006) that is central to the long-term flourishing of Māori as an indigenous group. In addition, Te Tiriti o Waitangi (Orange, 1987) provides the framework for any response to Māori needs and aspirations to ensure notions of rangatiratanga (authority), mana motuhake (autonomy) and mauri ora (flourishing) are foundational to Māori flourishing into the future.

5.2 Tagata Pasifika in NZ

Tagata Pasifika (Pasifika) or Pacific people are one of NZ’s most established migrant populations. Pasifika describes the heterogeneity of diverse persons from the islands that lie within the anthropologic classifications of Micronesia, Melanesia, and Polynesia. In NZ, the terms Pacific and Pasifika refer to Polynesians whose culture, language, heritage, and ethnicity originate from the islands of Samoa, Tonga, Niue, Cook Islands, Fiji, Tokelau, and Tuvalu. While there are many similarities between the Pacific Island nations, there are also distinctive differences and nuances that set them apart, such as the levels of acculturation, migratory patterns, and citizenship.

Pasifika population is the fourth largest ethnic group in NZ, accounting for 381,642 people (8.1% of NZ’s population). Almost half of Pasifika are Samoans (48%) followed by Cook Islands Māori (21%), Tongans (22%), Niueans (8%), Fijians (5%) and Tokelauans (2%) (StatsNZ, 2018). Almost 56% of Pasifika in NZ aged 15 to 64 were born in NZ (StatsNZ, 2018). This proportion might suggest that more than half of

Pasifika are more likely to speak English as their first or second language. Over 42% of Pasifika can converse in at least two or more languages, that is, the language of their parents and English or, another Pasifika language (StatsNZ, 2018). Pasifika migration to NZ began in the 1950s and more noticeably in the 1960s as a response to labour demands due to post-war losses and minimal population growth in NZ (Ichikawa, 1971; Spoonley & Bedford, 2012). Accordingly, the NZ government sought workers from Britain and Western Europe for the skilled occupations, and its former Pacific territories (that is Western Samoa, Cook Islands, Niue and Tokelau) and also Tonga and Fiji for the unskilled occupations (Brosnan et al., 1995). As a result, many Pasifika left their homes to pursue work and a new life in NZ with the intentions of supporting their families back in the islands (De Bres & Campbell, 1975).

The oil crisis of 1973 resulted in an economic recession that generated high unemployment, poverty and other social problems that disproportionately impacted on the wellbeing of Pasifika in NZ. Subsequently, the Labour Government in 1974 reformed NZ's immigration policy to tighten migration permit regulations of migrants, particularly Pasifika migrants. At the same time, the state and media targeted Pacific migrants for 'overstaying' their visa permits and 'stealing' New Zealand jobs (Anae, 1997), and exacerbating the benefit system, social services and housing shortages. Government officials coined the label 'Pacific Islander' which was used interchangeably with overstaying and portrayed a derogatory Pacific stereotype (New Zealand Race Relations, 1986). During this period, many New Zealanders developed an intense aversion for the Pacific people and were perceived as the least favoured ethnic migrants (Spoonley, 2006).

The deportation of thousands of Pasifika who had overstayed their permits commenced in 1974, in the so-called 'Dawn Raids' (De Bres & Campbell, 1975). Interestingly, Pasifika accounted for the minority of overstayers, with the majority (66.5%) being from non-Pacific countries, such as the United States and United Kingdom (New Zealand Race Relations, 1986). Hence, the foreboding shadow of discrimination to the Pacific people permeated NZ communities, society and work.

Pasifika migration continued in the 1980s, as evidenced with greater waves of Tongans and Fijians and significant numbers of migrants with permanent residence. Net migration in the mid-1990s averaged 3,300 per year. New Zealand employers tended to favour Pasifika as reliable workers in labour-intensive, low-skilled jobs (Spoonley, 1978). However, in light of the recession and redundancies that narrowed the size of the industries and sectors, Pasifika were disproportionately affected as disadvantaged ethnic minorities. Reduced wages and joblessness impacted on groups of Pasifika families in New Zealand and the Pacific Islands. As a result, many Pasifika families encountered new forms of financial liabilities and precarious loans to pay existing mortgages, debts, and creditors while at the same time meet cultural expectations such as remittances (Ofe-Grant, 2018). Thus, the ingrained stereotype of Pasifika as overstayers, beneficiaries, and low-skilled workers was established, and endures to this day.

From the first recorded Pasifika employment statistics to today, it is evident that Pasifika tend to cluster in labour-intensive, low-skill and low-paying jobs (MBIE, 2019; NZ Department of Statistics, 1976). Their representation in jobs with limited mobility and low income restricts their opportunities for participation in the economy and society and diminishes their full potential as contributing members of NZ. This limitation is unfortunate given the link between low pay, wellbeing, and other social outcomes.

6 Further context: NZ's education and training system

New Zealand has a largely state funded public education system that provides the majority of the funding and quality control for three levels of education: Early Childhood Education (ages 3 to 5); School education (from ages 5 up to 19); and a tertiary sector (ages 15 and above). While the focus of the project is on adult literacy, it is not possible to identify causes, remedies and impediments to adult literacy and numeracy without first considering the wider context of the NZ education system. This section provides a very high-level outline of the main components of the NZ education system and then provides some more detail on NZ's engagement with two OECD tools which are particularly relevant to the current project: DeSeCo and the L+N measurement tools family (IALS, ALLS and PIAAC). It also discusses the Adult Literacy Strategy in more detail. Detailed information on the adult L+N intervention landscape in NZ is not provided here as a separate paper is being produced as part of this project.

It is important to note however, that this applies to those adults who have grown up, through most of their formative years, within this environment. Immigrants who arrive as adults will have a different literacy and numeracy background from that described here and becomes an important component of adult strategies to improve these basic skills if necessary.

6.1 A brief history of education in NZ

New Zealand has a long history of state funded public education. This developed from ideas about democratic and progressive education in the late nineteenth century. The creation of an education system that aimed to reduce inequalities and enable social mobility was an important goal for New Zealand's early educational reformists (Olssen, 1992). From the passing of the Education Act 1877 that established New Zealand's first secular, compulsory and free national system of primary education through to the current day, most education in New Zealand has been publicly funded. That Act and those since also sought to establish standards of quality of education in NZ.

Today Education in New Zealand is:

a student-centred pathway providing continuous learning progression and choice so that:

- students progress every year, and
- their learning at one level sets the foundation for the next steps along a chosen pathway.

(MoE, 2019b).

It is also designed around a goal of lifelong learning through an integrated assessment and qualification framework.

There are three levels in New Zealand's education system:

- Early childhood education (ECE) — from birth to school entry age
- Primary and secondary education — from 5 to 19 years of age. This education is compulsory from 6 years of age until 16 years. However, most children start primary

school when they turn 5. Only 0.8% of children are home schooled and do not attend a formal education provider (MoE, 2020). Beyond 16 years of age it is no longer compulsory but is still fully funded in the state sector.

- Further education— higher and vocational education.

Each level has specific goals and assessment phases aimed at ensuring all children receive a consistent, high-quality education at all levels.

6.2 Early childhood education (ECE)

This level of education is optional but currently 96.8% of children attend some form of ECE (MoE, 2019b). The government subsidises all children who attend ECE for up to 6 hours a day (a total of 30 hours per week). A higher funding subsidy is available for all children aged 3-5, whereby the cost can be fully subsidised for up to 20 hours a week. There are a range of types of ECE services but in order to receive the funding, a provider must provide learning that is guided by the Te Whāriki curriculum framework. One such ECE service type is Kōhanga Reo, which has the goal of immersion in te reo Māori language and tikanga Māori (Māori custom). There is no formal assessment framework at this level.

6.3 Primary and secondary education

Primary and secondary schools are the next level of education. Education is free⁴ between the ages of 5 and 19 at state schools (schools that are government owned and funded). Schooling is compulsory from the age of six 6 to 16. In the majority of schools, a child can start school on the day they turn 5 years old (they do not have to wait until the start of a new school year). However, some schools have a policy of starting children at school together as a group at the start of each term (cohort entry). Most children stay at school until they are around 17 years old at the end of year 12 or 13. There is minimal drop-off rate until the end of year 11 (approximately 15-16 years old). Then there is approximately a 5% drop-off rate between years 11 and 12 and a further 13% between years 12 and 13. However, this means that just over 80% of students complete 13 years of school education.

Within this school sector there are three types of school: state schools; state-integrated schools, and; private schools. Most schools in New Zealand are owned and funded by the state (state schools). They teach the national curriculum and are secular (non-religious). Like state schools, state-integrated schools are funded by the government and teach the national curriculum, but have a special character. They can have their own sets of aims and objectives to reflect their own particular values and are set within a specific philosophy or religion. They can also charge compulsory attendance dues. Private schools get some government funding but are mostly funded through charging parents school fees. They develop their own learning programmes and do not have to follow the national curriculum. Approximately 86% of current students are enrolled in state schools and a further 11% are enrolled in state integrated schools.

The private school sector is relatively small in NZ, accounting for the remaining 4% of students, and its size has remained relatively unchanged over the last two decades (Education Counts, 2020a). The state

⁴ Although designated as 'free' most schools charge a voluntary donation to support resources within the school. There is much debate about this, and recent changes have enabled schools to opt-in to a higher level of funding if they do not charge such a voluntary donation. This debate is beyond the scope of this work.

primary and secondary school sector includes Kura Kaupapa Māori (te reo and tikanga Māori immersion schools).

Within this sector there are a range of assessment points aimed at measuring achievement and identifying the need for remedial action. Generally speaking, the most common types of assessment a child is likely to encounter at primary school are an entry test, running records, 6 Year Net, Progressive Achievement Tests (PAT) and Supplementary Tests of Achievement (STAR) testing.

Children in NZ are generally assessed when they begin primary school as a new entrant. This school entry assessment enables teachers to gather information about their literacy and numeracy skills so they can better work with the children they have in their class. There are national tests that can be used for this assessment, but some schools may have developed an assessment tool that better suits them and their students. These assessments are for internal use only so do not relate to any previously attended ECE or and are not reported on to the Ministry of Education (MoE).

Running records are then an ongoing form of assessment that gives teachers reliable information about a student reading skills and fluency. Once reading fluency is achieved, running records are no longer held on a student. It is around this time that STAR testing picks up to assess a student's reading progress and ability.

The 6 Year Net (Observation Survey) assessment happens when the student is Year 2 and turns six years old. It is a one-on-one assessment with the teacher to assess mastery of many of the pre-learning skills for both literacy and numeracy. It includes things like identifying letters, understanding print concepts, (e.g. reading from left to right and top to bottom, and making connections between the text and illustrations), reading text, recognising words, writing vocabulary (students are asked to write as many words as they can and know in 10 minutes), and hearing and recording sounds in words. These assessments are also used to identify children who require remedial assistance through programmes such as Reading Recovery.

From Year 3 onwards, formal assessment tends to be through Supplementary Tests of Achievement (STAR) and Progressive Achievement Tests (PAT). The PAT tests are designed to assess listening comprehension from Year 3, reading vocabulary from Year 4 and both reading comprehension and maths from Year 4. PAT test results give teachers an idea of how a student measures against the national results of other students the same age and in the same year group. Again, these tests are used for internal purposes and are not generally reported on to the MoE.

At secondary school the formal, reported assessment programme begins, usually in Year 11 though some students may start earlier. This programme is the National Certificate of Educational Achievement (NCEA). Usually this assessment occurs during a student's last 3 years at school (Years 11-13). NCEA is designed to measure a student's performance against standards of achievement or competency. They can achieve NCEA at 3 levels in a wide range of courses and subjects. This then forms the entry criteria for many higher learning programmes.

6.4 Further Education

The current structure of the New Zealand further education sector was largely the result of the Education Act 1989. The changes embodied in this Act were part of a wider strategy of government objectives that included:

“Developing a culture of lifelong learning; integrating all forms of post-compulsory education and training into a coherent system; gain better value for money from public expenditure on tertiary education; and [to] implement policies that are stable and fiscally responsible.” (Todd, 1994, p. 9)

This heterogeneous sector can be broadly broken into the following parts though the lines between each have become rather blurred over time. They have also become rather blurred between the school sector with schools offering trades academies and the youth guarantee offering students school level qualifications.

Technical and vocational education

At senior secondary school level students may begin to specialise in vocational learning. They can get help into work or further education from a number of programmes and institutions.

Youth Guarantee

Youth Guarantee courses provide students aged 16–19 with an opportunity to study towards NCEA Level 1-3 or Level 1-3 certificates at tertiary providers free of charge. These courses are usually vocationally focused.

Trades academies

Trades academies teach trades and technology programmes to students in Years 11-13 (ages 15-18). They are run through schools and other providers.

Institutes of technology

Institutes of technology and polytechnics teach professional and vocational education and training from introductory studies to degrees.

Industry Training Organisations

Industry training organisations (ITOs) represent particular industries (for example, agriculture, building and construction, motor trade). Over time, individual industry based ITOs have merged into 11 organisations. They design qualifications for the sectors they represent, primarily level 4 apprenticeships and provide guidance to employers on workplace learning including literacy and pastoral support for the trainees that enrol in ITO qualifications. They are funded by the government and industry (Careerforce, 2019; ITF, 2016).

Private training

Private training establishments offer specific vocational courses at certificate and diploma level (for example, travel and tourism).

Wānanga

New Zealand has 3 wānanga (state-owned Māori teaching and research institutions). They teach according to āhuatanga Māori (Māori tradition) and tikanga Māori (Māori custom). They offer certificates, diplomas and degrees. Some teach in specialised areas up to doctorate level.

Universities

New Zealand has eight predominantly state-funded universities. Each university offers degrees in a large choice of subjects and has strengths in specialised professional degrees. All of these universities are well recognised internationally. They work with universities in other countries on research and teaching programmes, and with the business community in New Zealand and overseas on research and development.

Industry training providers (ITPs) and ITOs are currently undergoing reforms instigated by the Review of Vocational Education and Training (RoVE) as part of the Education (Vocational Education and Training Reform) Amendment Act. This Act came into force in April 2020, with a transitional period until December 2022. As at the 1st of April 2020, 16 ITPs were merged into NZ Institute of Skills and Technology, which is a nationwide organisation responsible for supporting both workplace-based (on-job) training, and classroom-based (off-job) training. As such some of the functions of ITOs will transition into this organisation. However, the merge process will not conclude until 2022, in the meantime ITOs are currently operating as Transitional Industry Training Organisations (Careerforce, 2020). Aspects of the ITO system will also contribute to six Workforce Development Councils (WDCs) that cover the vocational pathway sectors of 1) Manufacturing, Engineering and Logistics; 2) Construction and Infrastructure; 3) Creative, cultural, recreation and technology; 4) Health, community and social services; 5) Service Industries; 6) Primary industries. The development of the WDCs have been accelerated due to the impact of COVID-19 (TEC, 2019). Other organisations created by these reforms include Centres of Vocational Excellence, Regional Skills Leadership Groups and Te Taumata Aronui – a group designed to ensure the reforms reflect the Government’s commitment to Māori Crown partnerships (TEC, 2020).

The parts of the education system most relevant to this project and literacy education policy development will be described in more below. What is clear from this brief summary though is that there are multiple points throughout an individuals’ ECE, schooling and further education where any literacy and numeracy difficulties should be identified, and, remedial strategies implemented (note these remedial programmes are publicly funded). Therefore, two important aspects that will need to be investigated in the data are whether an individual with low skills went through any/all of the above described system and; if they did, when did they exit it. The qualitative work can assist in identifying issues in this sector that may be amenable to policy correction and strategies to remediate these shortcomings when the individual is an adult.

6.5 DeSeCo: Adapting an OECD tool for the NZ context

As a member country, NZ has actively engaged with OECD skills development activity. This subsection describes NZ’s engagement with two relevant OECD tools: DeSeCo and the L+N measurement tools family (IALS, ALLS and PIAAC). Simultaneously NZ developed a number of other significant strategies relevant to the skills focus of this research: the Tertiary Education Strategy, the Adult Literacy Strategy and the Industry Training Strategy. This subsection looks at the implementation of the key competencies expressed in DeSeCo within the NZ context.

In the first decade of the 21st century the DeSeCo developments were of interest to the MoE, both broadly in relation to the context of Aotearoa NZ and specifically in relation to the developing New Zealand Curriculum (NZC) (Hipkins, 2018). Launched in 2007, the NZC represented a rebuild of the

school curriculum for the knowledge society of the new century. It is in this setting that the MoE sought to draw on the DeSeCo key competencies in the development of the NZC.

The process included making changes to the DeSeCo key competencies to reflect and suit the particular context of Aotearoa NZ. The years 2003 to 2006 saw several rounds of debate over how the competencies should be adjusted as a number of models were developed and discussed, each representing a further refinement in a stepwise consultative process (Hipkins, 2018). During this time various expressions of the competencies thought to be important in the NZ context were discussed. Importantly, work was also undertaken on a set of values and on identifying future focused themes that would be important for developing the final form of the NZC. Reference to learner identity, belonging and wellbeing persisted through the various iterations. In the final version, the key competencies are framed by a vision statement, values and principles. Furthermore, by the time the NZC was launched, the MoE had succeeded in aligning the key competencies through all levels of education from early childhood to tertiary.

The initial grouping of key competencies proposed for the NZC were similar to the DeSeCo key competencies but also “took account of cultural influences seen to be important in the New Zealand context” (Hipkins, 2018, p. 3). Comparing the NZ key competencies with the OECD’s, the differences were explained as including a focus on:

communal learning, not just ‘an unduly individualistic approach’; competencies needed for supporting and contributing to the wellbeing of others, including family; and a more explicit development of thinking that included ‘metacognition (thinking about thinking), reflectivity and creativity’ (Brewerton, 2004, p. 12, cited in Hipkins, 2018, p. 3).

The final list of competencies for the NZC comprised thinking; using language, symbols and texts; managing self; relating to others and participating and contributing. For the tertiary sector these were thinking, using tools interactively, acting autonomously and operating in social groups.

What is important to note here is that Aotearoa New Zealand has drawn on the DeSeCo key competencies and further developed them to better suit and reflect our context. What is also of note is the location of our key competencies in a framework of values and principles guided by an overarching vision. Along with excellence and innovation, inquiry and curiosity, the values include diversity, equity, community and participation, ecological sustainability, integrity and respect. The principles are high expectations, Treaty of Waitangi, cultural diversity, inclusion, learning to learn, community engagement, coherence and future focus. The vision, shared across all levels of the education sector, is that education in Aotearoa New Zealand will lead to confident, connected, actively involved lifelong learners (MoE, 2007, p. 7). Taken together, with each component taken seriously, there is a clearly articulated intention to include all New Zealanders in an educational journey towards collectively and individually experienced participation and engagement in learning and in life.

6.6 NZ’s Adult Literacy Strategy

Released in 2001, the Adult Literacy Strategy was the government’s response to the IALS finding that over a million NZ adults were below a ‘functional’ level of literacy (Walker et al., 2001). Under this definition, people are thought to be able to ‘function’ in life and work if they are at Level 3 or above on the five-level framework. The strategy’s broad goal was “that over the long-term New Zealanders should enjoy a level of literacy which enables them to participate fully in all aspects of life, including

work, family and the community” (MoE, 2001, p. 6). This was to be achieved by increasing opportunities for literacy learning, developing the capability of the sector to deliver literacy teaching, and improving the quality of literacy services (MoE 2001). The Adult Literacy Strategy refers to literacy in English and te reo Māori and defines literacy as “a complex web of reading, writing, speaking, listening, problem solving, creative thinking and numeracy skills” (MoE, 2001, p. 6).

The Adult Literacy Strategy was critical to the development of sector capability that followed and has enabled many thousands of adults to participate in literacy and numeracy education that would not have otherwise been available to them. Aligned components of IALS, ALL and PIACC have shown improvement in the New Zealand data but there are still large numbers of New Zealanders who are not ‘functional’ in their literacy (are below Level 3) according to these measures.

It is important to note the tensions that swirled around the Adult Literacy Strategy when it was launched and which, to varying degrees, continue to the present day. The first of these relates to the extent to which a Māori perspective on literacy was included in the strategy, beyond reference to te reo Māori. Many Māori adult literacy educators were concerned about the narrowness of the definition of literacy used in the strategy and the absence of a Māori viewpoint. In response, and commissioned by Te Puni Kokiri, *Te Kawai Ora: Reading the world, reading the word, being the world* (Māori Adult Literacy Working Party, 2001) set out an alternative approach, based on a definition of literacy as “the lifelong journey of building the capacity to ‘read’ and shape Māori and other worlds” (p. 1). This definition reflected a much broader meaning of the term ‘literacy’ that could (and did) include not only different languages but also different modalities (Jewitt & Kress, 2003). In other words, it strongly reflected a conceptualisation of literacy as a multiple rather than singular construct in keeping with the New Literacy Studies (c.f. Street; Barton & Hamilton, 1998; Gee, 2008). Beyond this, it addressed Treaty of Waitangi obligations which the Adult Literacy Strategy could not be said to have met at this point.

Another area of tension was the relative emphasis put on economic relative to social purposes of literacy. While at that point, ‘functionality’ in a knowledge society had come to refer internationally to both economic and social life (Holland, 1998), policy efforts to increase literacy abilities of populations tended to focus on human capital benefits more so than social capital benefits. This criticism has also been levelled at the Adult Literacy Strategy.

The extent to which literacy is a set of isolable skills or social practice was also debated. Despite the decades-long and extensive body of research and theory supporting the view that, while including skills, literacy is primarily social practice, it is still widely treated by governments as if it is primarily skills. Furthermore, governments are inclined to more strongly value literacy skills or practices associated with the dominant societal institutions (e.g. education, health) or workplaces. This stance is problematic for non-dominant (e.g. Māori) or marginalised groups (e.g. the unemployed).

The publishing of the first Tertiary Education Strategy (TES) in 2002 (MoE, 2002) ignited a different discussion again, this time about the meaning of the term literacy and numeracy in comparison and in relation to the term foundation skills, the focus of the third-named of six strategies prioritised in the original TES. Both the language of the TES and the implementation of the Adult Literacy Strategy demonstrated that literacy was the primary focus of both. However, the Tertiary Education Commission, which was charged with implementing the TES, steered the manifestation of the Adult Literacy Strategy implementation in particular directions. One of the consequences of these reforms is

that all parts of further education and upper secondary school had to demonstrate their literacy strategies. The emphasis on the role of literacy was intensified after the election of the National Government when public funds were targeted away from traditional adult and community education and compliance-based industry training towards embedded literacy programmes (Industry Training Federation, 2016; Piercy & Cochrane, 2015). It is important to note that the definition of literacy has narrowed through the implementation of adult literacy work. Indeed, the MoE's own assessment in 2008 was that the new articulation of literacy is more specific and less broad (MoE, 2008). Reviewing the progress of the adult literacy work in 2017, Hunter and Furness found even more narrowing.

The Adult Literacy Strategy has not been rewritten since 2001, but two implementation plans have been produced. The first – *Literacy, language and numeracy action plan 2008 – 2012* (TEC, 2008) was the government's response to the New Zealand Skills Strategy call for further action to raise the literacy and numeracy levels of the workforce (Business NZ, New Zealand Council of Trade Unions, Industry Training Federation, & New Zealand Government, 2008). The second – *Literacy and Numeracy Implementation Strategy 2015-2019* (TEC, 2015) was more broadly focused in line with the 2001 Adult Literacy Strategy. The life of this latter document has expired and has not yet been reported on nor replaced with a plan for the next time period.

Around the same time as the 2015 implementation strategy, *Haea te pū ata: A national strategy for Māori adult literacy and numeracy 2016-2020 (and beyond)* was developed by NZCER (Hutchings & Ikin, 2020). This significant work reflects Māori values, realities and aspirations for the 21st century. The document sets out priorities and implementation steps and shows their alignment to key government documents including the TES's strategic goals and the key strategic goals of *He kai kei aku ringa: The Crown-Māori Economic Growth Partnership* (Māori Economic Development Panel, 2013). In their review of adult literacy and numeracy policies, Furness and Hunter (2017) found that some elements of Haea te pū ata are evident in the 2015 implementation strategy. For example, Workstream 1, which is aimed at "reach[ing] more people" by "increasing our focus on the workplace" and "collaborating with other agencies", mentions "work[ing] with agencies involved in Māori development initiatives such as *Whānau Ora*" (TEC, 2015, p. 10-11). However, they conclude that

...overwhelmingly Haea te pū ata has been drawn into the discourse of the Implementation Strategy and has lost much of its cultural and historical force...In particular the centrality of whānau wellbeing in in Haea te pū ata – foundational to Māori aspirations – is severely weakened in the Implementation Strategy where the workplace predominates at the expense of a broader focus (Furness & Hunter, 2017, p. 71).

7 How does NZ fare in terms of literacy and numeracy?

This section summarises some of the existing findings on NZ's skill levels, with a focus on L+N skills measurement from PIAAC and other internationally comparable surveys, such as PISA. Compared to other OECD countries, New Zealanders are highly skilled in literacy and numeracy. The issue for New Zealand lies in the distribution of skills – Māori and Pasifika people, the financially disadvantaged and the rural population all demonstrate lower skill levels than other groups in the population. This section breaks down these skills gaps by region, ethnicity, gender and socio-economic background using information from the PIAAC and PISA studies, highlighting issues such as declining skills levels of 15-year-old students in NZ, education and skill disparities and the consequent effects on the labour market including skill mismatches.

7.1 NZ's skills in a global context

New Zealand's adults are highly skilled relative to the other OECD countries. According to PIAAC, a larger proportion of New Zealanders have high literacy skills (16%) than low literacy skills (12%) – similar to Australia, and better than the US, Canada, England and Northern Ireland (MoE & MBIE 2016b).

Within the 55-65 age group, New Zealand has the second highest literacy score among PIAAC-participating OECD countries, 10th highest numeracy score, and 4th highest problem solving score. Within the 16-24 age group, New Zealand ranks 12th, 18th and 8th respectively (MoE & MBIE, 2016b; Jones & Satherley, 2017). The relatively poorer performance of the younger age cohort, along with falling scores in the OECD's PISA test of 15-year olds (see below) is concerning for potential future trends in adult literacy and numeracy in NZ.

NZ has the highest share of adults among PIAAC-participating countries who are proficient in problem solving (10%). This is almost double the OECD average of 5.4%. A smaller proportion of New Zealand adults have the lowest level of literacy and numeracy skills than in the other OECD countries (OECD, 2016).

However, skills variation in NZ is greater than the other high-performing countries, although it is the same level as the OECD average (OECD, 2016). This means that although the averages are high, there are equity issues and groups within the population with skills levels which could be improved upon. This is discussed in more detail in Section 4.3.

For those with no qualifications, average literacy and numeracy skills are lower than Australia, Japan, Finland and the Netherlands, but higher than Canada, US, England, and Northern Ireland. The gaps in literacy and numeracy scores between those with tertiary and no formal education are also smaller than the OECD averages (MoE & MBIE, 2016a, 2016b; OECD, 2016).

NZ's level of education is also relatively high. NZ has the highest participation rate of 25-64 year-olds in education of all the PIAAC-participating countries. The gap between participation rates of those with low and high skills is narrower than the OECD average as well (OECD, 2017b).

However, NZ youth have lower participation rates in education compared to other OECD countries, and this is closely related to their lower skills compared with older demographics. In addition, according to

PISA, New Zealand youth are less likely to read books than the youth in other OECD countries which further explains the skills gap. For NZ youth, the proportion that had low skills had not changed from 2006 to 2014, even though the 2014 cohort had a higher average level of education (Jones & Satherley, 2017). This further highlights that while qualifications and skills are positively correlated, higher education levels do not automatically translate into higher skill levels.

PISA also reveals that the average skill level of NZ's 15-year olds has decreased since 2015. In the past 18 years, scores have decreased by 23 points for literacy, 22 points for science and 29 points for mathematics, in absolute terms. For perspective, 30 points is the equivalent of one year of learning. Although New Zealand's scores remain above the OECD average, the decline in students' skills is an ongoing issue (Avvisati et al., 2018). As mentioned above, this raises concerns for the level of literacy and numeracy among NZ's adults going forward. Only six other countries exhibited a similar decline in students' skills over this time period - Australia, Finland, Iceland, Korea, the Netherlands, and the Slovak Republic (OECD, 2019a).

In NZ, the average literacy score for 15-year olds is 506, which is higher than the OECD average of 497 points. The average numeracy score for this group is 49, which is very close to the OECD average of 48, again showing the persistence in lower numeracy skills across all demographics in New Zealand. A larger proportion than the OECD average achieved scores in the highest category for each subject, while simultaneously, a larger proportion also achieved the minimum level in at least one subject. That is, there are distributional issues in skill levels in NZ. The issue of poor performance persists in some groups, with mathematics being the weakest area, causing barriers to mathematics-related fields and explaining New Zealand's low numeracy scores relative to literacy scores (Avvisati et al., 2018; OECD, 2017b).

There are also indications that these disparities are getting worse. The lowest-achieving students have had the most drastic declines in PISA literacy scores, while the declines in science and numeracy were similar across all students. The proportions of top-achieving students in numeracy and science have decreased, while the proportion of low achieving students has increased, despite the number of high school qualifications increasing (Avvisati et al., 2018).

7.2 Skills within NZ over time and across different groups

New Zealand has high education and skills levels. Adults' literacy, numeracy and problem solving skills are higher than the OECD averages (OECD, 2016). New Zealand adults' numeracy skills are low relative to literacy skills however, with 16% of NZ adults scoring in the two highest literacy skill levels, greater than the OECD average of 11%, while NZ adults' numeracy scores are about the same as the OECD average (OECD, 2016).

In terms of education, the level and number of qualifications attained has been increasing over time. From 1996 to 2013, the proportion of New Zealanders with at least a bachelor's degree increased from 10% to 22%, and the proportion with no qualification decreased from 31% to 17%. More New Zealanders have also gained NCEA level two and three qualifications. Although this increase in time spent in education seems like it would enhance New Zealand's skills performance, those who have a bachelor's degree or higher today demonstrate lower skills levels than those with the same qualifications in the 1996 cohort. This trend is also observed in those without formal qualifications reflecting demand in the labour market – upskilling and higher education is necessary for more jobs and this has reduced the selectivity of those entering higher levels of education. It could also be

explained by less challenging coursework within such degrees. Due to the shift towards higher skills requirements for jobs, those without qualifications in 1996 would not have needed them for work, but would still have managed to develop their skills in work, whereas today those with no skills have less opportunity to transition away from low-skilled labour (MoE & MBIE, 2016a).

As both groups are showing declining skills over time, the skills gap between those with a bachelor's degree or higher and those with no degree has shrunk by 3%. This decrease in the skills gap shows that the decrease in skills is greater for those with a bachelor's degree or higher, and this is another issue for New Zealand. Although people are going through higher levels of education, the lower barrier to entry in such courses is negatively impacting the potential skills of university students (MoE & MBIE, 2016a).

On an individual level, a higher qualification is associated with higher skills. The average skill level is 36% greater for someone with at least a bachelor's qualification when compared with someone with no qualifications (MoE & MBIE, 2016b). Skills also improve with age until around 35-44 years old, with 35-44 year-olds having the highest skill level compared with all other age groups (MoE & MBIE, 2016b).

Distribution of skills and education by region

Skills levels in New Zealand differ by rural and metropolitan regions. Otago, Auckland, Wellington and Canterbury (metropolitan) have higher skills which is associated with higher levels of education. However, Auckland has slightly lower literacy skills due to the relatively high level of immigrants whose first language is not English (Lane, 2010).

There is substantial interregional disparity in skills within Auckland. South and East Auckland have the lowest literacy skills in the country, mostly due to a higher prevalence of individuals for whom English is a second language. In other parts of Auckland, the population with high skills is 50% greater than those with high skills in the rest of New Zealand, largely due to higher education attainment. Outside of metropolitan areas, skill acquisition comes from adaptation to job requirements (Earle, 2018).

Distribution of skills and education by socio-economic background, ethnicity and gender

Using data from PIAAC, research has found that NZ Europeans have the highest average skills levels, while Pasifika people have the lowest. Within this spectrum, the Asian and Māori populations have similar literacy scores, but numeracy scores are slightly lower for Māori. The average numeracy scores for Māori and Pasifika people are 33 points and 57 points lower (respectively) than that of NZ Europeans (MoE & MBIE, 2016b; Jones & Satherley, 2018). The influence of socio-economic background on skills is higher than in other OECD countries which reinforces the issue that certain groups are disadvantaged (OECD, 2017b).

Controlling for education, Māori have similar measured literacy and problem-solving skills as non-Māori with the same qualification levels, but lower measured numeracy. Māori are also more likely than non-Māori to gain lower qualifications than their parents and already 49% of Māori do not have a parent that has completed at least NCEA level 2 or an equivalent qualification (Jones & Satherley, 2018). Further work within this project will look at ethnicity differences in more detail to see whether these still hold after controlling for other factors which tend to vary by ethnicity, such as first language and socioeconomic background.

Although the gaps between Māori and Pasifika and other groups exist, they have been decreasing over time. This is due to the rate of improvement in skills and education being disproportionately faster for Māori and Pasifika when compared with other ethnic groups. This has been an increase from 4% to 13% and 3% to 13% (respectively) in the attainment of at least a bachelor's degree for these groups (MBIE, 2019; Jones & Satherley, 2018). The increase in education and skills for Māori occurs in adulthood, and Māori youth are still less likely than other groups to engage in education (Jones & Satherley, 2018; OECD, 2019a).

The measured skill level among Pasifika is also increasing. Since 1996, Pasifika people's average literacy score has increased from 227 to 242. However, 20% aged 16-65 have had no experience with a computer and there is still a gap in skills and education between Pasifika and non-Pasifika people (Satherley, 2018).

Among PIAAC-participating countries, NZ had the second highest share of foreign-born adults in the population (25%) after Australia. Like other OECD countries with skilled migration policies, namely Australia and Canada, NZ immigrants tend to be relatively high skilled. Overseas born immigrants with English as a first language have higher skills than NZ-born citizens and are the most skilled non-native citizens of all the OECD countries (MoE & MBIE, 2016b, OECD, 2016). Moreover, according to PISA, NZ along with Australia and Canada, are the only countries where foreign-born 15-year-old students outperform native-born students (OECD, 2019b).

ESOL immigrants in New Zealand tend to have higher literacy and numeracy skills than those in other countries, however their literacy scores are still substantially lower (22 points) than native New Zealanders. This is lower than the OECD average difference between ESOL immigrants and native populations (30 points). The proportion of ESOL immigrants with low literacy skills is 23.4% which is higher than the 8.5% of English-speaking immigrants with low literacy skills. Similar patterns are seen in numeracy showing that ESOL immigrants tend to have lower skills on average than those who come from English-speaking countries. With rising immigration levels, this is an issue New Zealand should address to improve labour market outcomes for the ESOL immigrant population (OECD, 2016).

Another group that demonstrates disproportionately low skills are second generation immigrants (with ESOL parents) who have similar scores in literacy to and lower scores in numeracy than first generation ESOL immigrants. The proportion of these second generation immigrants with low numeracy skills is 42%, which is higher than the OECD average of 36% and suggests that improving their skills is an area to focus on, particularly because this group is over-represented in the proportion of New Zealanders with low skills, thus working on this issue would significantly improve New Zealand's overall skills levels (OECD, 2016).

Gender differences in literacy and numeracy skills change over time. Borgonovi et al. (2018) have combined PISA and 2011 PIAAC results from the same population to determine how such changes unfold. During primary school, there is no significant gender gap between girls and boys in both literacy and numeracy skills. As shown in the PISA results, once students hit high school, boys outperform girls in numeracy and girls outperform boys in literacy. However, the literacy skills gap between males and females has reduced due to stable performance from boys and declining performance from girls therefore may be seen as an issue (Avvisati et. al., 2018; MoE & MBIE, 2016b; OECD, 2016).

PIAAC results show that the gender gap in numeracy skills continues to grow in young adulthood while the gender gap in literacy converges to almost zero. Men are 2.5 times more likely to score at the highest level in numeracy skills in adulthood and the average difference in numeracy scores between adult men and women is 13 points, similar to the OECD average (Borgonovi et al., 2018; OECD, 2016).

Interestingly, there is no direct relationship between the magnitude of the gender gap in school and the gender gap in adulthood suggesting that choice of field explains much of this gap. Men tend to choose numeracy intensive fields, such as finance and engineering, which allows their numeracy skills to further develop during adulthood, while females tend to choose literacy intensive fields such as administrative roles. Because literacy skills are necessary across all fields and occupations, the gender gap tends to decrease. This is reinforced by the gaps that emerge in high school (Borgonovi et al., 2018; MoE & MBIE, 2016a).

The gaps between genders are systemic and have been constant over time using data from 2000 to 2006. After young adulthood the gender gaps stabilise on average, likely due to the adjustment to occupations and decreasing rate of skills development (Borgonovi et al., 2018).

Gender differences are more pronounced as education levels increase. Between males and females aged 25-65 with no qualifications, numeracy scores are 3% higher for men. Between males and females of the same age with a bachelor's degree or higher, numeracy scores are 6% higher for men.

Living in a less deprived area, having parents with higher education, speaking English at home, reading books and computer use all explain variation in measured PISA skill levels (Jones & Satherley, 2017; Lane, 2010). Socio-economic background explains 14% of the variation in numeracy skills and science skills in students. Disadvantaged students also have lower ambitions for themselves in the labour market which is an issue for New Zealand's population of skilled workers, necessary for the requirements of many jobs – two fifths do not expect to achieve tertiary education (Avvisati et al., 2018).

New Zealand skills and the labour market

Overall, NZ has a high level of employment and a relatively low long-run unemployment rate. However, those with lower skill levels are at greater risk of poor labour market outcomes. Like in other countries, employment in NZ is shifting towards higher-skilled occupations, which will exacerbate existing disparities in the labour market (OECD, 2017a).

Additionally, in NZ, an individual's skill level has a greater impact on labour force participation and wages than in other OECD countries (OECD, 2016). The majority of NZ adults (87%) who score in the top two literacy skills categories are employed, compared with 62% of those in the lower two categories. This employment gap is higher than the OECD average and highlights the issue of low skills negatively impacting labour market outcomes (OECD, 2016). Labour market participation is also lower for groups with low-average skill levels – particularly Māori and Pasifika groups (Jones & Satherley, 2018).

More nuanced measures of employment outcomes further highlight labour market disparities. Limited employment – defined as minimum wage employment and underutilisation (covering the unemployed, time-related underemployment and the potential labour force) – is higher among women, Māori and Pasifika people (Erwin et al., 2019; McGirr, 2019). The highest rates of limited employment among Māori and Pasifika people reflect lower education and skill levels among other factors (McGirr, 2019).

Existing research also suggests that the relationship between employment and wage outcomes and skill levels also differ by ethnicity. Employed Māori with moderate (level 3) literacy and numeracy skills have significantly lower average earnings than non-Māori with the same level of literacy. This may be due to a range of factors, including that the Māori population is younger on average than the non-Māori population, and/or because there is a greater concentrate of Māori in lower-paid occupations (Jones &

Satherley, 2018). Further analysis that will be undertaken as part of the current wider project may shed further light on this.

Skills mismatch, where workers' skill level is above or below that required for their job, is also an issue in NZ's labour market. The rate of skills mismatch in NZ is 28%, slightly higher than the OECD average of 25%. Over-skilling is more common and in line with the OECD average, however the share of under-skilling is also an issue with a rate of 10% compared with the OECD average of 7%. The probability of skills mismatch is lower for NZ immigrants overall. However, immigrants are less likely to be over-skilled and more likely to be under-skilled than the native population (McGowan & Andrews, 2017; OECD, 2017b).

There are consequences of skills mismatching for individuals. Those who are over-skilled earn less than those whose skills match the requirements of their job, mostly because over-skilled workers are employed outside their field of specialisation. These over-skilled workers earn 14% less than skilled well-matched workers in the same field, which is the same as the OECD average. Skills mismatch in New Zealand is most concentrated in the fields of teaching and humanities, languages and arts, and is lowest in agriculture (OECD, 2017a). There are also consequences at the aggregate level, with estimates suggesting that improving the allocation of skills in NZ to OECD best practice could be associated with an increase in productivity of around 7% (McGowan & Andrews, 2017; OECD, 2017a). For employers, skills shortages are also an issue in NZ when compared to other OECD countries, and are related to weak numeracy skills, with the hardest jobs to fill being tradesmen and engineers (OECD, 2017a).

8 Conclusion

This literature review informs the project **‘The experience, expression and transcendence of low skills in Aotearoa New Zealand’**. The overarching goal of this mixed-methods project is to provide policy recommendations to improve the life-course trajectories and socioeconomic outcomes of adults living with low literacy and/or numeracy (L+N) skills. The research aims to shape the ways in which we seek to enhance L+N in Aotearoa NZ with a focus on effective intervention.

Some important first questions are what is meant by the terms ‘skill’ and ‘competency’ and how are these related to literacy and numeracy. While these terms are fundamental components of skills development work and the current research, the contested and complex nature of the concepts that these terms represent means that there is no straightforward answer to these questions.

Several definitions of ‘skill’ have been advanced, but there are some areas of commonality. First, skill is socially constructed and, therefore, context plays a key role in what is classified as skill, which skills are valued in a society and how policy settings seek to measure and advance them. Another commonality is that skill is something that is done, such as a decision-making process or performance of a task. A third consideration is the relevance of place and actors in the application, recognition and deployment of skill. A fourth common feature is the acknowledgement that there are different kinds of skills that are deployed with different levels of complexity. One way the literature has tried to grapple with this variability in skill complexity is by looking towards L+N skills – the focus of this research – embedded within other skills as a mitigating factor, on the basis of a belief that enhancing L+N will enhance the learning and application of other skills.

The related term ‘competency’ is often conflated with the term ‘skill’. However, a competence is more than skill and comprises the application of skills, knowledge and attitudes. Competence involves the ability to mobilise psychosocial resources (including skills, attitudes and knowledge) in a particular context. For example, the ability to communicate effectively is a competence that may draw on a person’s knowledge of language, practical IT skills and attitudes towards those she is communicating with.

As with the term ‘skill’, L+N have varied and contested meanings. L+N can be thought of as domains of skills (or competencies) in their own right and as embedded in, and foundational to, the development of other skills. Importantly for our research, they are also thought of in a third way, as social practices. Debates about the meanings of L+N have focussed most strongly on meanings of literacy with two broad pathways emerging: literacy as skills and literacy as social practices. Literacy as skills includes the notion that literacy is a set of technical communicative abilities that people learn, with the focus on reading skills and strategies including decoding, word recognition and comprehension. This tendency to treat literacy as an autonomous skill occurs despite the understanding that skills are socially constructed. In contrast, literacy as social practice does not exclude the notion of literacy as skills but rather clarifies that literacy is not only skills. Literacy is primarily a relational activity in which the meaning of literacy lies in its uses and the meaning of its uses to people in their lives not in the literacy itself.

The quantitative component of this project focuses on OECD’s large-scale surveys of skills, particularly the Programme for the International Assessment of Adult Competencies (PIAAC). Therefore, the design features of PIAAC and how it defines and measures skills is of relevance.

PIAAC measures three domains of skill: literacy, numeracy and problem-solving skills in technology-rich environments (PSTRE). It is a nationally representative survey of 16-65 year olds involving about 5,000 respondents in each of the over 40 countries that have participated to date. It is predominantly a computer-adaptive survey, although a paper version is administered to participants who have no computer experience or who request it. As a representative survey, it allows the exploration of the relationship between individual and household characteristics and L+N skills within NZ. The study also aims to capture meaningful changes in skill levels over time, so countries can track their own progress and their progress relative to other participating countries over time as data from more survey cycles become available.

PIAAC's definition of literacy focuses on understanding, evaluating, using and engaging with written texts in order to participate in society, achieve one's goals and develop one's knowledge and potential. The definition of numeracy adopted for PIAAC focuses on managing situations or solving problems in a real context. Finally, PSTRE involves using digital technology to acquire and evaluate information, communicate with others and perform practical tasks.

PIAAC defines 'low skills' in terms of the proficiency score that the individual achieves. Those scoring at or below Level 1 are considered to be low-skilled. Adults at Level 1 can complete simple forms, understand basic vocabulary, determine the meaning of sentences and read continuous texts with a degree of fluency. Similarly, those with Level 1 numeracy can perform simple processes involving counting, sorting, basic arithmetic operations, understand simple percentages and locate and identify elements of simple graphical representations.

Despite the valuable contributions of OECD's large-scale skills surveys, it is important to keep its limitations in mind. First, the view of literacy that takes centre stage in many OECD countries, including NZ, is a skills-focused view. Although the socially constructed and context-specific nature of skill is acknowledged, L+N are predominantly treated as if they are isolable skills. This raises three broad issues. The first is the tendency for universalism, resulting in a lack of recognition of the importance of local context. The second is the partiality of the notion of L+N used in international tests in comparison to the diversity of literacies used by people in their lives. A third related concern is the marginalising effect on other literacies and those who use them to reify a particular set of skills.

While there is controversy over what constitutes 'skills', there is a broad consensus that lifting skill levels at individual and societal levels leads to improved economic and social outcomes. As such, skills are considered a central policy tool for achieving economic growth, wellbeing and equity goals. This is reflected in the OECD's Better Life initiative, which stems from concerns over the ways in which social and economic gains have slowed, or even reduced on some dimensions, in member countries. In a similar vein, the NZ Treasury has developed a Living Standards Framework. It includes 'Human capital' as one of its four capitals, alongside natural, social and financial/physical capital. It uses a broad definition of human capital as the capabilities and capacities of people to engage in work, study, recreation, and social activities, and includes skills, knowledge, physical and mental health. As with the OECD's Better Life index, this Living Standards Framework was borne out of concerns about wellbeing and equality, and the desire to pay greater attention to the interactions between financial/physical, natural, social and human capital.

What is the evidence behind this policy emphasis on education and skills as a way to achieve both economic and equity goals? Looking across countries, there is strong evidence that high L+N within a country is positively related to individual earnings, a more equal distribution of income, and higher rates of economic growth. These positive relationships also exist when using traditional measures of skill, such as years of schooling and the stock of educational qualifications, but effects are more pronounced

when using L+N skills. Thus, both cognitive skills and qualifications tend to have positive, but separate effects on economic outcomes. Within-country studies also highlight that L+N is positively associated with the likelihood of obtaining qualifications, securing employment and higher earnings. In terms of broader wellbeing outcomes, there is also evidence that higher L+N is associated with better physical and mental health, higher trust in others, greater political voice and lower rates of criminal offending.

While quantitative studies find a positive relationship between L+N skills and a range of socioeconomic outcomes, this is not always captured when diverse experiences are taken into account. It is, therefore, important to also consider qualitative research. Qualitative research illuminates the multiple ways in which people use L+N in their lives that are of value to them regardless of any formal measure of their L+N skills. Some repeated findings from international qualitative work includes that many of the hardest-to-reach learners have highly developed skills and competencies, but have also had negative educational experiences and faced a range of constraints. Findings from NZ studies are similar: adult learners already have skills and talents that they use in their daily lives and have lives which are already busy and often complex.

Given the importance of context to skills, it is relevant to reflect on the unique context of Aotearoa NZ. Of particular importance to the NZ context is our unique biculturalism and legacy of colonisation. The processes of colonisation over 200 years has resulted in a system of assimilating Māori as British subjects and dislocating them from their traditions, cultural structures and knowledge. Consequently, NZ has an underserved population and the disparities experienced by Māori give little regard to the structural inequities that are attributable to the long-term impacts of the social determinants of health and colonisation. Recognition of New Zealand's unique bicultural commitment to maintaining its partnership relationship remains. This means that a response to Māori flourishing in the future must be culturally located and collectively orientated. Māori flourishing must take into account the physical and social settings in which we conduct our everyday lives. A holistic and relational approach to health and wellbeing emphasises the collective unit over the independent person that is central to the long-term flourishing of Māori as an indigenous group. In addition, Te Tiriti o Waitangi provides the framework for any response to Māori needs and aspirations to ensure notions of rangatiratanga (authority), mana motuhake (autonomy) and mauri ora (flourishing) are foundational to Māori flourishing into the future.

As one of NZ's most established migrant populations, Tagata Pasifika, or Pacific people, also add a unique richness to the NZ context. Pasifika migration to NZ began in the 1950s as a response to post-war labour shortages. They were mostly employed in labour-intensive, low-skill and low-paying jobs; a trend which continues to this day. However, when recession brought high unemployment in the 1970s, the state and media targeted Pacific migrants for 'overstaying' their visa permits, and many were deported in the so-called 'Dawn Raids'. In reality, Pasifika accounted for the minority of overstayers, highlighting the discrimination of Pacific people in NZ. An ingrained stereotype of Pasifika as overstayers, beneficiaries and low-skilled workers endures to this day.

While the focus of this project is on adult literacy, in order to understand the NZ context and identify possible cause, remedies and impediments to adult L+N, it is necessary to consider the wider context of the NZ education system. New Zealand has a largely public education system, with the state providing the majority of the funding and quality control for three levels of education: early childhood education, school education, and further (tertiary) education. Two aspects of the further education landscape that are particularly relevant to adult L+N are the adaptation and adoption of OECD's Definition and Selection of Competencies (DeSeCo) Programmes and NZ's Adult Literacy Strategy. Overall, NZ has drawn on the DeSeCo key competencies and further developed them to better suit and reflect our context. Of note is the location of our key competencies in a framework of values and principles guided

by an overarching vision. The adult L+N intervention landscape will be detailed in a separate paper that is being produced as part of this project.

The development of the NZ Curriculum which was launched in 2007 sought to draw on the DeSeCo key competencies. The process included making changes to the DeSeCo key competencies to reflect and suit the particular context of NZ. Along with excellence and innovation, inquiry and curiosity, the values include diversity, equity, community and participation, ecological sustainability, integrity and respect. The principles are high expectations, Treaty of Waitangi, cultural diversity, inclusion, learning to learn, community engagement, coherence and future focus. The vision, shared across all levels of the education sector, is that education in Aotearoa NZ will lead to confident, connected, actively involved lifelong learners. Therefore, there is a clearly articulated intention to include all New Zealanders in an educational journey towards collectively and individually experienced participation and engagement in learning and in life.

The Adult Literacy Strategy was released in 2001 and was the government's response to the IALS finding that over a million NZ adults were below a 'functional' level of literacy. The strategy's broad goal was "that over the long-term New Zealanders should enjoy a level of literacy which enables them to participate fully in all aspects of life, including work, family and the community". The Adult Literacy Strategy was critical to the development of sector capability that followed and has enabled many thousands of adults to participate in literacy and numeracy education that would not have otherwise been available to them. However, it is important to note that there are tensions surrounding the Adult Literacy Strategy that continue to the present day. These include: the limited extent to which a Māori perspective on literacy was included in the strategy; the emphasis on economic relative to social purposes of literacy; and the extent to which literacy is seen as a set of isolable skills. Despite these criticisms, the Adult Literacy Strategy has not been rewritten, but the Implementation of the Adult Literacy and Numeracy Strategy 2015-2019 was released in 2015. The life of this document has expired and has not yet been reported on nor replaced with a plan for the next time period.

The quantitative component of this project will make extensive use of the PIAAC data, and therefore an overview of the existing evidence on NZ's skills from this and other large-scale skills survey is informative. Overall, NZ has a high level of measured L+N relative to other OECD countries. However, L+N levels are particularly high compared with other countries for the older age group (55-65 years), but our international rankings are lower for the younger age group (16-24 years). Moreover, NZ's results in OECD's survey of 15-year-olds, PISA, have been falling in absolute terms, as well as relative to other countries. This raises concerns about the potential future trends in adult L+N in NZ. Moreover, the variation in skills is greater in NZ than in other high-performing countries. This raises equity issues, with Māori and Pasifika people, the financially disadvantaged and the rural population all having lower measured L+N levels than other groups in the population. In terms of the labour market, NZ has rates of skills mismatch that are higher than the OECD average, with under-skilling being a particular issue.

This literature review provides a range of background and contextual information to inform our wider research programme investigating the life-course trajectories and socioeconomic outcomes of adults living with low L+N skills. Future research will provide novel insights into these issues, with the aim of shaping the ways in which we seek to enhance L+N in NZ, and a focus on effective intervention.

9 References

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