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**An integrated approach: Holistic assessment of
vocational trainees in the NZ dairy farming industry**

**A thesis presented in partial fulfilment of the requirements for the
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Abstract

Vocational training qualifications in New Zealand have undergone significant change since 2008 due to the Targeted Review of Qualifications (TRoQ) initiated by the New Zealand Qualifications Authority (NZQA). In 2016, Primary ITO introduced programmes for these new qualifications to the dairy farming sector. A new holistic assessment approach was implemented, centred on an integrated Evidence Portfolio.

The purpose of this research was to:

- a) Compare the new assessment methodology with the previous approach, from the perspective of the Trainees, Employers, and Assessors, and:
- b) Determine the extent to which the new assessment approach enabled Learners to apply theoretical knowledge to practical workplace situations.

While much research has been done about competency-based Vocational Education and Training (VET), it largely focusses on institution-based learners, not those who are based in the workplace. This research aimed to contribute to the literature by examining competency-based assessment in a post-TRoQ, New Zealand workplace-based context.

The sample groups for this research were drawn from dairy farming trainees who were enrolled in the new qualifications, and had also achieved one of the previous qualifications. The employers and assessors of these trainees were also included. The research utilised semi-structured interviews with the participants to gain their views on the new assessment methodology and how it compared to the previous method.

The findings of this research largely reinforce the literature on competency-based VET. A new contribution is made by examining competency-based VET in a workplace-based context. The new assessment methodology was successful in enabling trainees to apply their theoretical knowledge to practical workplace situations and it was preferred by the participants over the previous assessment method.

It is concluded that the notion of how competence is viewed in a New Zealand VET context should be revisited, and that it could assume a wider focus. This research also highlights the link between underpinning theoretical knowledge and practical workplace performance and suggests that performance of practical workplace tasks could provide sufficient evidence to assess Trainees' theoretical knowledge in the final stages of their qualification.

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Chapter 1: Introduction

“Experience without theory is blind, but theory without experience is mere intellectual play” – Immanuel Kant.

1.1 Background

In 2010, the New Zealand Qualifications Authority (NZQA) initiated the Targeted Review of Qualifications (TRoQ). The aims of this initiative are listed below:

1. Develop a unified New Zealand Qualifications Framework.
2. Require the use of existing quality assured qualifications and change the design rules for National (standards-based) and New Zealand (course-based) qualifications to allow for more inclusion of local components.
3. Require mandatory periodic reviews of qualifications to determine whether they are still fit-for-purpose.
4. Strengthen and standardise qualification outcome statement requirements.
5. Introduce a mandatory pre-development assessment stage for qualification developers.
6. Strengthen recognised industry involvement in qualification development.
7. Provide the public with clear information about whether a qualification is active, inactive or closed.

(NZQA: 2009, Targeted Review of the Qualifications System, 2009, p.1)

The review of all the agriculture qualifications was initiated in 2011 under the Agriculture ITO, and the new agriculture qualifications were listed on the NZQA framework in November 2013. Over 2014 and into early 2015, Primary ITO (formerly Agriculture ITO) developed and gained NZQA approval for programmes for the new agriculture qualifications. These new programmes were originally intended to be introduced in June 2015; however for a number of reasons, this date was extended. In January 2016, these new programmes were introduced into the dairy and sheep and beef farming sectors, replacing the old National Certificates and Diplomas.

The key difference between the old National qualifications, and the new, New Zealand qualifications, is the focus on graduate outcomes rather than unit standards. The graduate outcome approach to the new qualifications focusses on the psychomotor, cognitive, and affective aspects of graduates.

During the TRoQ, and subsequent qualification development process, these graduate outcomes were represented as graduates skills, knowledge and attributes – or what a graduate should “know, do and be”. This shift was a significant departure from the National qualification system where learners were assessed on their competence in unit standards. Completed unit standards were then put together according to the qualification rules, to award a learner the qualification (an example of an old National qualification, and a New Zealand qualification are shown in Appendices A and B). Under the National qualification system, theory and practical unit standards were generally assessed in isolation from each other, and there was often no logical “thread” in terms of a learners’ capability, holding a qualification together. Qualification achievement was based around meeting the qualification rules, without any consideration of the overall capabilities of the graduates on completion. Added to this, the assessment of unit standards was often fragmented and atomised, and even at a unit standard level there was little consideration given to a learners’ overall capabilities.

For some time, there had been a desire within the Education Team at Primary ITO, even within the old unit standard based qualification system, to move towards a more holistic assessment regime which recognised learners’ overall capabilities, rather than the atomised parts of individual practical or knowledge-based unit standards. The introduction of programmes towards the new qualifications was seen as an ideal opportunity to review the assessment system that was being used for the National qualifications, and bring in something that would meet the requirements of both the new qualifications, and the desire to introduce a more integrated and holistic assessment method. The result was the integrated Evidence Portfolio (EP) which is the subject of this research.

The assessment method for the old National qualifications in the agriculture sector consisted of the theoretical knowledge unit standards being assessed by contracted tutors, as part of classroom-based off-job training days for each programme. The practical unit standards were assessed based on a Trainee’s practical, on-farm performance, using a “work diary”. A trainee’s employer or workplace supervisor was their verifier. The work diary was filled in by the trainees and their verifier. The information in the work diary was used by the assessor, along with an assessment conversation with the trainee and the verifier, as evidence to make a judgement of competence against the practical unit standard. The assessors in both situations are Primary ITO Training Advisers. (An example of part of a work diary and an EP are shown in Appendices C and D). When designing the programmes the qualification graduate outcomes were broken down into smaller, more manageable learning outcomes, for the purposes of learning and assessment. The new EP was designed to be able to allow much more integration of practical tasks and theoretical knowledge, to enable the

assessors to make a more holistic assessment of trainee's capabilities, based on the learning outcomes of the programme, which contributed to the graduate outcomes of the qualification.

1.2 Why do the research?

At the time of the development of the new qualifications, and subsequent programmes for these qualifications, I was the manager of the Primary ITO Education Team. Together with my colleagues, we had a lot of experience in Vocational Education and Training (VET) in the agriculture sector. It was felt that we were on the right track with the EP assessment method; however the decision to introduce this assessment method was largely intuitive and based on experience.

The purpose of doing this research was to find out how well the new assessment method actually worked, and where it could be improved. Over the next three to five years, a further 20 – 30 programmes leading to the new qualifications will be implemented across the wider primary sector. It was considered important to validate the proposed new assessment method and learn of any pitfalls or problems with it so it could be improved upon for the next tranche of programmes to be introduced.

It was also noted at the time of developing these new programmes that there was very little evidence-based research internationally on workplace-based assessment in the VET sector. Due to the fact that Primary ITO was among the first Industry Training Organisations (ITOs) to implement the new qualifications post-TROQ, there was no experience within New Zealand of how the implementation of the new qualifications worked. The main purpose of doing the research, which is encapsulated in the two research questions, was to find out how well the new EP assessment system worked for the various participants compared to the previous assessment method, and how well it enabled integration of theoretical knowledge and practical skills, in keeping with the intent of the graduate outcome-based new qualifications.

There was also a desire to contribute to the knowledge of VET in a New Zealand industry training context. The outcomes of this research could be of potential value to other ITOs with similar training systems, and ultimately contribute to shaping the future of workplace-based VET in New Zealand.

1.3 How was the research done?

A qualitative, case-study based approach was determined to be the most appropriate method to conduct the research. The study was conducted by interviewing Trainees, Verifiers and Assessors about their experience with the EP, from their own perspective. The dairy sector was chosen over

the sheep and beef sector, largely because there were higher numbers of trainees involved. Sheep and beef farms also tend to be more remote and widespread, making the logistics of visiting the study participants more difficult. Trainees who had completed one or more of the old National qualifications, and who had enrolled in one of the new, New Zealand qualifications were invited to participate in the research. These Trainees were grouped in two different geographic locations, one group in the North Island and one in the South Island. Their voluntary participation was sought, along with that of their workplace Verifiers and Assessors. An initial visit to participants was undertaken early in 2016 to give them some background to the study, and to seek confirmation that they consented to their involvement. The participants were then visited in May/June of 2016 and interviewed to find out their views on the EP and how it had worked from their perspective.

1.4 Outline of this Thesis

Chapter 1 is an introduction to the research that was conducted, and outlines the background context to the study, why it was done and the methodology involved.

Chapter 2 is a review of the literature. This looks at adult learning in a wider sense, before focussing more specifically on VET, and assessment in a VET context. Some conclusions are reached on what the current literature has shown, and where the gaps might be addressed by this Thesis investigation.

Chapter 3 discusses the methodology used to conduct the research, and why it was deemed to be appropriate. The research questions for the study are introduced. Research and ethical principles are examined, such as validity and integrity of the data, and potential ethical issues considered.

Chapter 4 outlines the practical implementation of the research, how it was managed and any problems or issues that were encountered during the implementation period.

Chapter 5 presents the findings of the research. It looks at the findings of all the data across the three sets of participants, identifies areas of commonality and shows the results of how the participants felt about their use of the EPs.

Chapter 6 discusses the findings. The findings of the research are analysed against the literature. Alignment of the research findings with the literature is examined. Finally, an argument is made for research results to make a potential original contribution to the literature.

Finally, **Chapter 7** is the conclusion, where the research questions are answered, outcomes and implications from the research are discussed and some recommendations are made.

Chapter 2: Literature review

2.1 Principles of Adult Learning

In the 1970's and 1980's, David Kolb was one of the first people to look specifically at learning in an adult context. He developed his experiential learning model or cycle, based around a concrete experience, followed by reflective observation, abstract conceptualisation and active experimentation (Baker, Robinson & Kolb, 2012). Kolb further developed the thinking of John Dewey, whose theory about experiential learning was based around the idea that for education to be effective the content needed to be presented in such a way that allowed the student to relate the topic to their experiences (Dewey, 1938). More recently, it has been recognised that adults learn in quite different ways to children.

At its broadest, pedagogy is the theory and practice of education. While there are varied approaches to pedagogy, it is often understood to focus more on the *teaching*, rather than the *learning* aspects of education. Pedagogy has also been developed more specifically around the education of children. The concept of andragogy is more commonly associated with the education of adults. The distinction between pedagogy and andragogy has been written about by many authors. Riggs, DeSilets and Dickerson (2010) define pedagogy as content focussed and involving an “expert” leading the session, while andragogy is defined as “learner-driven education incorporating motivational principles, placing value on life and learning experiences” (Riggs et al., 2010, p. 388). Galbraith and Fouch (2007) refer to andragogy simply as the study of adult learners. There is widespread agreement (e.g., Caruth, 2014; Fornaciari & Lund-Dean, 2014; Knowles, 1978; Sang, 2010) that andragogy is about the principles of adult learning as distinct to that of children.

Knowles (1984, cited in Galbraith & Fouch, 2007, p. 36) identified the characteristics of adult learners as being:

- Autonomous and self-directed.
- Having an accumulation of life experiences.
- Goal-oriented.
- Relevancy-oriented, or wanting immediacy.
- Practical. Focussed on “what” and “why” so learning can be implemented.
- Respecting – of life experience and freedom of expression.

Adult learners are different from children in their motivations, interests, values, attitudes, physical and mental abilities, and learning histories (Kennedy, 2003, cited in Westover, 2009, p. 435). Learning programmes designed for adult learners, such as those in a Vocational Education and Training (VET) context, are likely to be more effective if they recognise these differences, and incorporate some key adult learning principles in their design.

Westover (2009) outlines ten important characteristics of adult learning:

- I. Learning is a process that lasts throughout the lifespan of most people.
- II. Learners must be an active participant in the learning, not a passive recipient of information.
- III. Learners must be responsible for their own learning.
- IV. The learning has an affective component as well as an intellectual component.
- V. Adults learn by doing.
- VI. Problems and examples must be realistic and *relevant to learners* [italics in original].
- VII. Adults relate their learning to what they already know.
- VIII. An informal learning environment works best.
- IX. Variety is stimulating. A range of learning techniques is important.
- X. Learning flourishes in a win-win, non-judgemental environment.

Both Kennedy (2003) and Knowles (1984) have identified similar characteristics of adult learners, particularly those of practicality, relevancy, and the importance of life experiences. Merrill (2002) espouses a more overarching view with his five first principles of instruction, based on research into a range of instructional design theories. These principles are that learning is promoted when: (a) learners are engaged in solving real-world problems; (b) existing knowledge is activated as a foundation for new knowledge; (c) new knowledge is demonstrated to the learner; (d) new knowledge is applied by the learner; and (e) new knowledge is integrated into the learner's world (Merrill, 2002).

There are as many subtle variations on this adult learning theme as there are authors. However, there is broad agreement that adult learners have different characteristics to children. Of greatest importance for adult learning is utilising their existing knowledge gained from life experiences, and new learning being relevant and applicable to the realities of their daily lives. This concept is highly applicable to adult learners in a VET context, particularly the New Zealand, ITO based VET system where learners are in employment rather than enrolled at a learning institution. Merrill's (2002) principles above are applicable in this context and reinforce the concept that adult education is

more focussed on learning rather than teaching. Adult learners need to *construct* knowledge, rather than *acquire* it in order for it to make sense in a workplace or even in daily life.

2.2 Vocational Education and Training

The world of VET, as a specific subset of adult learning, has some distinctive characteristics. Collis and Margaryan (2005) propose that a mixture of formal and informal learning is ideal as the strengths of both approaches can come into play. Formal learning in this context can be defined as structured or course-based learning, which is usually based around achievement of a qualification or defined learning outcomes. Informal learning is unstructured and happens more naturally, as part of daily life or work and often centres around experimentation and discussion which is often not recognised as learning by learners. The strengths of formal or course-based learning are identified as the ability to take time for reflection and having opportunities to compare a particular problem-solving approach with colleagues, whereas informal learning has the advantages of being directly relevant to one's work, and of being tested in practice as the learning occurs. The idea of blending work-based activities within formal courses is proposed, ensuring learning activities are "anchored in authentic practice" and are "focussed on developing learners' ability to solve the problems of their everyday professional job roles" (Collis & Margaryan, 2005, p. 726). In other words, skills and knowledge are constructed by learners in the context of which they will be used, rather than an abstract context.

The principle of authentic learning in context is one of the fundamental tenets of VET. Coetzer (2006), in a study of employees learning in small manufacturing firms in New Zealand, found that small businesses are less suited to formal training and employees need learning tasks that are varied, complex, and that pose problems to solve, and encourage risk taking. He also identified that active experimentation is important for learning to occur, and that learning is enhanced if learners have a wide scope for action and opportunities to participate in problem-solving exercises (Coetzer, 2006). Galbraith and Fouch (2007) reinforce Coetzer's findings when they discuss the concept of praxis, which is action with reflection as distinct from only practice (Galbraith & Fouch, 2007). They propose that whether learning is inductive or deductive, for adults learning new tasks or content and seeking to apply these to new scenarios or circumstances, praxis allows learners to practice the new skill, while also analysing the quality of that practice.

Brinkerhoff (2006) argues that not only is it important for learning to be in context in the workplace, but there needs to be other workplace management strategies in place. He found that the "impact

from training is a function of high-quality training intervention that operates in conjunction with a healthy, aligned and integrated set of performance system factors” (p. 37). The workplace performance system factors relate to issues such as the learner’s readiness or suitability for the training intervention and the ability to, and support for, putting the new skill or learning into practice in the workplace. Brinkerhoff (2006) estimates that over 80% of the impact from training is determined by these workplace performance system factors, while only 20% is determined by the quality of the training intervention itself (Brinkerhoff, 2006). This finding reinforces Coetzer’s (2006) study which showed that managers needed to move towards a coach/facilitator role, rather than a directing role, and that people in these workplaces needed opportunities to use their skills and abilities. Both Brinkerhoff (2006) and Coetzer (2006) identified that a learner’s ability to experiment, have some autonomy of action in the workplace and having workplace management strategies in place to allow the embedding of learning to occur, are key aspects of successful workplace training. This current research is attempting to aid understanding of the link between the theory learnt in a training intervention and the extent to which that theory is applied in the workplace, along with how that application may be used as a valid measure of new knowledge.

A further theme for Coetzer (2006), as he explored employee learning in small New Zealand manufacturing firms, was that of adaptive versus developmental learning modes. An adaptive mode of learning requires learners to evaluate outcomes and make minor corrections in the way methods are used to solve problems. A developmental learning mode requires learners to engage in a more active process of knowledge-based problem solving through experimentation (Coetzer, 2006). Coetzer asserts that developmental learning is more innovative and is associated with experimentation and risk-taking. While both methods are complementary, and a combination of both is desirable, businesses and individuals get trapped in solely adaptive modes of learning (Coetzer, 2006).

Soden and Halliday (2000), in their case study on the “vocationalisation” of the curricula of Further Education Colleges in the United Kingdom, discuss the concept of “situated learning” being the development of beliefs and practices that are specific to a particular culture, such as a workplace. They found that expertise arises from knowledge being integrated and transformed through practice, and that performance of real tasks allows formal knowledge to become fused with the demands of practice (Soden & Halliday, 2000, p. 173-174).

Poortman, Illeris and Nieuwenhuis (2011) expand on the notion of context and authentic learning in their apprenticeship study in the Dutch VET sector when they discuss a skill acquisition model that moves through five stages of: Novice; Advanced Beginner; Competent; Proficient; and Expert. They

conclude that workplace learning partly takes place in a social interaction domain, which involves both direct interaction with work colleagues, peers and teachers, and indirectly with media.

They discuss six main types of progressive social interaction in this context:

- I. Perception – learner registers information in a mostly passive way.
- II. Transmission – learner is actively listening, taking notes, or processing information in an active way.
- III. Experience – learner is trying out performance under guidance of a mentor, instructor, or colleague. Involves feedback and explanation and correction.
- IV. Imitation – learner is specifically copying activities from an instructor or mentor.
- V. Activity – learner is working independently with supervision in the background.
- VI. Participation – learner is working autonomously in cooperation with colleagues.

(Poortman et al., 2011)

This progression is reinforced by Tanggaard and Elmholdt (2008) with their “ladder of increased participation” shown below, which similarly outlines the principle of learning in the workplace which commences at a low level and proceeds to more demanding levels with new tasks.

1	‘Apprentice tasks’ (e.g. mopping the floor)
2	Simple routine tasks not involving much professional knowledge, but still important work
3	Watching the journeymen do difficult tasks requiring excellent professional skills
4	Guided participation—doing tasks where the journeymen explain along the way
5	Work alone on simple routine tasks where solutions are known
6	Work alone on difficult tasks where solutions are unknown
7	Responsibility for work and for other apprentices

(Tanggaard & Elmholdt, 2008, p. 106)

It seems clear that while the principles of adult learning are critical to the success of any VET programme, the key principles of learning: being authentic, in a workplace context, and directly relevant to learners work practices, are fundamental foundations on which to build. Both Poortman et al’s (2011) skill acquisition model and Tanggaard and Elmholdt’s (2008) “ladder of increased participation”, describe a learning journey from novice to mastery and are essentially an apprenticeship model. These researchers reinforce Merrill’s (2002) five first principles of instruction as discussed in section 2.1, in that the learning takes place in, and is integrated into the learner’s world.

This workplace “apprenticeship” model pre-dates formal education and is the basis of modern VET. The model emphasises the role and responsibilities of the workplace in the learning as discussed by Brinkerhoff (2005), Coetzer (2006) and Collis and Margaryan (2005). While this model demonstrates the importance of workplace engagement in the learning process, we also need to consider the validation of that learning, and learner achievement via an assessment process. This research will gain some insight into how knowledge-based learning is applied to, and assessed, in an authentic workplace context and how relevant it is to learners work practices. The research will also contribute directly to a greater understanding of the connection between knowledge learned, and its application; and therefore what impact this could have on how learning is structured, and also on subsequent workplace performance.

2.3 Competency based assessment and training

Most VET systems developed over the past 20-30 years are based on principles of adult learning. Countries with a modern VET system have a type of competency based approach. Weigel, Mulder and Collins (2007) compared the idea of competence between four European countries; England, Germany, France and the Netherlands. Collins (2007) identified commonalities between the four countries including:

- a change from an input (curriculum) to an outcome or output-based approach;
- a shift from a discipline or subject based approach to competence-based;
- attention directed towards accreditation of informal competencies acquired outside a formal education setting.

There were also differences between the countries, particularly in the way competence is viewed. In England, competence is based on workplace needs and is defined in terms of outcomes, demonstration and assessment based around a set of National Vocational Qualifications. France has a relatively complicated VET system, whereby competence is based around both individual skill levels related to the job as well as an ability to progress occupationally. In the Netherlands, competence is largely based around identifying performance improvement. The German VET system has two distinct parts, off-job theory learning and on-job practical workplace learning (Weigel et al., 2007).

The German VET model is analysed in more detail by Hellwig (2006) and compared to the Australian VET system. She discusses the two key principles of German VET being “dualism” and “vocationalism”. The dualism aspect of German VET refers to the duality of two learning sites – the

workplace for practical, on-job learning and a vocational school for off-job, theoretical learning (Hellwig, 2006). The concept of competence is debated in Germany, as it is in many countries, and there is no common understanding of exactly what it means. The “most discussed and agreed on” approach to competency in the German context is the concept of “Professional Action Competency” (Hellwig, 2006, p. 7). Hellwig identifies four components to this concept:

- I. Professional competency – based on practical skills and knowledge for mastery of specific workplace tasks.
- II. Methodical competency – analytical or problem-solving skills, ascertained by the procedural skills and knowledge required to be able to apply methods and techniques in different contexts.
- III. Social competency – skills required for communication and social interaction
- IV. Personal competency – personal attributes such as attitudes, value judgements, motivation, self-organisation, and self-reflection.

Hellwig’s (2006) concept of competence is quite broad and is interesting in that practical workplace skills and knowledge form only one part of competence, which focuses as much on the person and their attributes as their occupational skills and knowledge. This concept is compared to the Australian VET model where, while both systems broadly accept that competence is based on the knowledge and skills that apply in a workplace, the Australian model of competency is narrower and focusses on technical and workplace oriented competencies rather than the German “Professional Action Competency” (Hellwig, 2006, p. 12-13). New Zealand’s VET system has tended to take a similarly narrower view to competence, based around evidence of skills and knowledge, usually separately, and has largely ignored the personal attributes of learners used in the German model. One of the outcomes of this research will be to gain an insight into how a slightly wider view of competence could be taken by better integrating the skills and knowledge aspects of the learning, and understanding how these are synthesised or integrated into evidence of competence in a more applied context.

Smith (2010), in a review of competency based training in Australia discusses some key aspects of the Australian VET system. A 1997 report (Smith & Keating, 1997, cited in Smith, 2010, p. 55) on the Australian VET system noted that it was “overwhelmingly competence based” and that:

- there was a focus on outcomes;
- outcomes were measured against specified performance standards;
- performance standards were related to industry.

Smith notes that the Australian notions of competency are similar to those of the U.K. and are based specifically on workplace competencies, whereas the European countries take a broader view of competence which aligns with Hellwig's (2006) findings. One of the identified weaknesses (Smith, 2010) with the Australian competency based training approach was the specific focus on the ability of learners to be able to do the job, which has reduced the emphasis on assessment of knowledge. Smith (2010) identified that both workplaces and learners would prefer more attention was paid to the necessary underpinning knowledge. She notes that, over the past 10 years, assessment practices have moved from often fragmented checklist-type assessments based on observation of work practices towards more holistic assessment ensuring underpinning knowledge is adequately addressed (Smith, 2010, p. 58 & 62). A similar shift has taken place in the New Zealand VET sector over the past 10 years and is discussed further in section 2.4.

Räisänen and Rökköläinen (2014) in their paper on the assessment of learning outcomes in Finnish VET discuss how assessment of vocational skills are context based and are assessed in real work, or authentic situations. These authors argue that assessment in the past had been done by teachers but now tends to be jointly done by teachers, students and workplace instructors to focus on:

- a) Mastery of the work process.
- b) The knowledge underlying the work.
- c) The work methods, tools and materials.
- d) The key skills of lifelong learning.

Boahin and Hofman (2014) also make international comparisons when they compare Australia and the UK with the USA and European ideas of competence. They summarise that Australia and the UK look at competence as "actions, behaviour or outputs which reflect skilled performance" (Boahin & Hofman, 2014, p. 82) which reflects a more outcome based system. The USA sees competency as being more about the underlying characteristics that allow an individual to perform; and the European perspective is about the capacity of people to perform specific tasks and roles to an expected standard in a given context. These different VET systems tend to focus more towards one end of the spectrum or the other. Australia and the UK take a more outcome or performance-based approach, whereas the USA and European approach is more about the people themselves and the characteristics they display. Boahin and Hofman (2014) conclude that competence is about an ability to perform activities or tasks to a required standard in a given, usually occupational context. The three components of skills, knowledge and behaviour (or attitudes) that enable successful job performance are integral to the notion of competence. Further research into how the cognitive

aspects of learning are integrated into workplace performance, and how this is assessed, will help to further refine the notion of competence in a VET context and appropriate methods of assessment.

While the New Zealand VET system is broadly similar to those of the UK and Australia, our system of workplace-based training and assessment appears to be somewhat unique. The New Zealand VET system is competence-based, and has for the past 20 years, been underpinned by competency-based assessment standards, known as unit standards. These unit standards are mostly based on knowledge and/or skills competencies for industry and are set and maintained by industry, via industry standard setting bodies. It has been challenging to define what competency means in the New Zealand unit standard context. Different standard setting bodies have had differing views on what competence means for their particular industries, and overly detailed or pedantic unit standards have often made assessment difficult.

NZQA, as the national quality assurance body for unit standards have issued guidelines for the principles of unit standard assessment (Best practice principles for the assessment of unit standards: June 2011). These guidelines give two overarching principles for the assessment of unit standards:

I. Principle 1: Assessment Design

Best practice assessment will occur when the assessor focuses on outcomes, and gives due consideration to all evidence requirements within the unit standard(s).

II. Principle 2: Assessment Decisions

Best practice assessment will occur when the assessor judges, overall, that the candidate has provided sufficient evidence that the outcomes, identified in the outcome statements, have been met.

While these principles are of some use to practitioners, they do not clearly define what competence means in a New Zealand context. Anecdotal evidence over the past 15 – 20 years would tend to confirm that the view of competence among VET educators in New Zealand is similar to that of the UK, where competence is based on workplace needs and links to outcomes of a set of national vocational qualifications; or Australia which is more specifically focussed on technical, workplace-based knowledge and competencies.

These varied, but similar approaches to competency are summarised in Table 1 below which has been developed to illustrate a synthesis of approaches.

Table 1: General approaches to competence by various countries	
Country	General approach to competence
England	Based on workplace needs and defined by outcomes, demonstration and assessment based around national vocational qualifications.
France	Based both on individual skill levels related to the job, as well as learners ability to progress occupationally.
Netherlands	Based around improvement of performance.
Germany	Competence is more holistic and is based around four components of: professional competency; methodical competency; social competency; and personal competency.
Finland	Based on assessment of work processes, underlying knowledge, work methods and key learning skills.
Australia	Focusses on technical and workplace ability more than underpinning knowledge.
USA	Based on the underlying characteristics that allow an individual to perform.
New Zealand	Based on workplace performance and theoretical knowledge, but typically assessed separately.

While there is still on-going debate about what competency means and how to define it, most countries with a fairly mature VET system have attempted to gain some clarity about what competence means in their system. Competence may be looked upon more broadly as being an amalgamation of skills, knowledge and behaviour, generally in a workplace or “authentic” context; or with a narrower focus based around specific, workplace related job skills. It is hoped that one of the outcomes of this research project may be to contribute to a clearer understanding of what competence means in a New Zealand VET context.

2.4 Assessment of competence

As VET systems have changed and matured over the past 20 years, so too have the approaches to assessment. One of the areas that has changed over time is a move from granular assessment, based on individual assessment criteria judged in isolation, to a more integrated, holistic approach to assessment. It has been common for assessment criteria to be broken down into small components, with assessment of each carried out in isolation. Once these components are put together, their sum assumes competence in the whole task.

Sadler (2007) discusses how the vocational qualifications in the UK are broken down into smaller and smaller units towards “atomised teaching and assessment”, and notes that “the relationships and dependencies that should characterise a good sequence of learning units tend to get lost when course documentation, teaching and assessment all focus on units, modules or even specific tasks as self-contained, hermetically sealed units” (Sadler, 2007, p. 390).

The New Zealand VET system, with its current system of qualifications based on the building blocks of unit standards has faced similar challenges. Unit standards are further broken down into outcomes and evidence requirements, and assessment processes for these are also often fragmented and done in isolation. Hoy-Mack (2005) identified this as a feature of the New Zealand system, and is similar to experiences in the Australian and Scottish systems where competency-based assessments were “fragmented, mechanistic, and overly checklist-oriented” (Hoy-Mack, 2005, p. 80). Her New Zealand study on the workplace assessment of ambulance officers looked at the holistic versus atomistic competencies, and the interplay between atomistic criteria and holistic tasks. Vaughn and Cameron (2009) propose that one of the reasons workplace assessment standards have become highly prescriptive is that when assessing in authentic, contextualised settings, assessor judgement becomes critical, and therefore consistency may be an issue (Vaughn and Cameron, 2009). Increasingly, there is agreement that competency-based assessment should encompass an overall view of a learner’s skills, knowledge and behaviour and show how these fit into a bigger picture of competence (e.g., Baartman, Gulikers, & Dijkstra, 2013; DiMartino & Casteneda, 2007; Fastré, Klink, Amsing-Smit, & Merriënboer, 2014; Gulikers, Bastiaens, & Kirschner, 2014).

Context is a key aspect to assessment of competence in a VET system. Poikela (2004) discusses how traditional assessment tends to be based on “measuring knowledge possession” and practical performance as two separate entities. This is typically done by two separate people – a teacher and a workplace supervisor - and, he contends, it is unlikely that these two parties will collaborate sufficiently to make an overall judgement about a learner (Poikela, 2004). He goes on to propose

that assessment that is context based will add in other situational factors to the assessment process. “Repeating a certain skill or retrieving a propositional piece of knowledge based on memory is not a valid proof of knowing. It is at least as important to assess the skills and know-how in a changing problem situation” (Poikela, 2004, p. 268). In other words, application of knowledge and skills to an authentic and dynamic environment is an important aspect of workplace learning and assessment.

Baartman et al. (2013) discuss how competence is context-dependent and that assessment of competence needs to cover the three elements of (a) an adequate knowledge base, (b) the professional performance of complex tasks, and (c) the ability for lifelong learning (Baartman et al., 2013). Sadler (2007) has a view that learners, when competent, should be able to do something they could not previously do, on demand, independently, and well. Both of these views reinforce the notion that assessment should not be a snapshot in time, but should include evidence of the ability to learn or adapt. This is the difference between competence being viewed as “has done” rather than “can do”, a concept proposed by Fastré et al (2014), and further discussed in the next section. Changing from viewing competence as a performance or outcome-based process that has occurred; to viewing competence as evidence that a learner is capable of performing future, as yet unknown, tasks based on their ability to learn new skills and knowledge, put it into practice, reflect on it and adapt as necessary, would be a paradigm shift in VET in New Zealand.

A study by the National Centre for Vocational Education Research in Australia (Gillis & Bateman, 1999) looked at the validity and reliability of workplace assessments and concluded that the method of gathering evidence, and the ways in which assessors use and interpret that evidence will impact on the validity and reliability of workplace assessment. Validity, in this context refers to how the evidence collected is used and interpreted, while reliability is concerned with how much error there is in the evidence and how consistently assessor judgements are applied. These two concepts introduce the dimension of the assessor into the assessment process (Gillis & Bateman, 1999).

Hase and Saenger (2004) built on this assessor’s perspective of competence in the workplace, in a study of the training of assessors in the workplace, based on the mining industry in Queensland, Australia. These researchers determined that one of the key challenges in workplace assessment was the ability of workplace assessors to make valid judgements. They determined a range of factors affecting this, which revolved around the training of workplace assessors and some practical realities of the workplace (such as conflict between the production-related goals of the workplace and the assessment requirements of the learners and assessors). This conflict is a reality for most workplace assessors in primary sector workplaces in New Zealand, and a lack of training and support for workplace verifiers and assessors has been identified. The ability to make valid assessment

judgements based on evidence of workplace performance requires significant skills. The change in assessment methodology that has recently been introduced to the pastoral qualifications is designed to assist workplace verifiers and assessors to make better assessment judgements. This study should give some useful insights into how well, or not, this new assessment methodology has achieved its aim.

2.5 Authentic assessment

As competence is related to a specific, usually workplace-context, there is a growing view on how assessment of competence will reflect the reality of this context. “Authentic” assessment is a widely used term which, while generally understood, still has some variation of interpretation. Most authors agree that authentic assessment relates to evidence of competency in a real-world environment, or an environment or situation that simulates this (e.g., Gulikers et al., 2008; Gulikers et al., 2014; Hagner, 2010; Reeves, 2007; and Sluijsmans, Straetmans, & van Merriënboer, 2008). In terms of assessment specifically, Gulikers et al. (2004) define authentic assessment as “an assessment requiring students to use the same competencies or combinations of skills, knowledge and attitudes that they need to apply in the criterion situation in real life” (Gulikers et al., 2004, p. 69). DiMartino and Casteneda (2007) identify that authentic assessment “requires students to use prior knowledge, recent learning and relevant skills to solve realistic, complex problems” (DiMartino & Casteneda, 2007, p. 38). Hagner (2010) introduces the term “naturalistic assessment”, which is defined as “the assessment of performance on real-world tasks and observation of responses in natural contexts” – as being synonymous with authentic assessment (Hagner, 2010, p. 28).

Gulikers et al. (2004) identified five dimensions of authentic assessment, which are:

- a. The assessment task – one that confronts students with activities that are also carried out in professional practice. They require students to integrate knowledge, skills and attitudes as professionals do.
- b. The physical context – the physical context of an authentic assessment task should reflect the way knowledge, skills and attitudes will be used in professional practice.
- c. The social context – authentic assessment should consider social processes that are present in real-life contexts. For example, collaboration.
- d. Assessment result or form – this relates to the quality, validity and fairness of the assessment.

- e. Criteria and standards – criteria are what the assessment is measuring (the outcome). Standards are the level of performance expected.

These five dimensions of authentic assessment link well to the reality of the assessment process in this research. The assessment design for the recently introduced pastoral qualifications reflect these five dimensions identified by Gulikers et al. (2004), and it is hoped that the data collected will improve knowledge and understanding of the realities of authentic assessment in a workplace context.

Sluijsmans et al. (2008) look at authentic assessment as part of a competency based learning model. They define competencies in this instance as “complex skills, consisting of integrated sets of constituent skills, with their underlying knowledge structures and attitudes” (Sluijsmans et al., 2008, p. 160). They note that, for assessment to be authentic, the tasks would typically be performed in a real or simulated environment and provide “whole-task” practice. Gulikers et al. (2004) demonstrated the value of authentic assessment to student learning. Their study found that all students, irrespective of their level of practical experience are stimulated to deeper studying for an assessment when they perceive it to be authentic. The more practical experience the students gained, the more they preferred genuine authentic assessment as opposed to simulated or role-play assessment and the less value they found in analytic performance criteria, as opposed to a more holistic view. Authenticity appears to be an important element of good competency-based assessment, when competence relates to a workplace or other specific context.

Timma (2007), in an Australian study of learning and assessing on-the-job in the food-processing industry, gained some insights into how workers themselves viewed authentic assessment. Authentic assessment that closely matched the activity of the work they were doing, and the skills training they had received was viewed as valuable by workers as they were able to make connections to the job. Workers noted that the authentic assessment practices influenced the way that they carried out their work as “they gained background knowledge and understanding about the reasons for work procedures being assessed” (Timma, 2007, p. 7). This form of assessment was able to assist workers in moving beyond carrying out tasks routinely, and enabling them to make informed decisions through having “gained background knowledge and understanding about work procedures” (Timma, 2007, p. 7). Authentic assessment also allowed workers to demonstrate their competence and ability to perform their work to an industry standard. Workers valued the “real life” assessment experiences where they could demonstrate the practical application of skills and knowledge through their actions, and their verbal responses to assessors.

Hagner (2010) notes some limitations to authentic or naturalistic assessment. There are issues of time and cost associated with implementing authentic assessment. Timma (2007) also notes that workplace “production demands as well as time and cost constraints” could restrict the choice of assessment methods available (Timma, 2007, p. 5). A second key factor in authentic assessment is that of reliability and validity. Reliability centres on the subjectivity of the assessment and the ability to compare assessment results; and the more loosely structured, context-dependent nature of the assessments. Validity refers to the “credibility” of the assessment and concerns the degree to which the findings of the naturalistic assessment correspond to what is being assessed. Hagner (2010) concludes that naturalistic assessments cannot match the precision with which tests can be validated because of their variability. Gulikers et al. (2004) have a different view of the validity of authentic assessments. These authors cite one of the most important reasons for using authentic, competency-based assessments as their validity. They break this down into their “construct validity”, which is related to whether an assessment measures what it is supposed to measure, and “consequential validity” which refers to the impact the assessment has on student learning. In terms of construct validity they propose that authentic competence-based assessments should:

- a. appropriately reflect the competency that needs to be assessed;
- b. involve authentic tasks that represent real-life problems of the knowledge domain being assessed;
- c. involve thinking processes used to solve the problem in real-life.

Based on these criteria, they conclude that “authentic competency-based assessments have higher construct validity for measuring competencies than so-called objective or traditional tests have” (Gulikers et al., 2004, p. 68).

The term “performance” is often used in reference to authentic assessments, as evidence of workplace or other contextual based performance of tasks is an integral part of authentic assessment. Fastré et al. (2014) take a deeper view of performance and distinguish between competency-based and performance-based criteria. These researchers conclude that the difference between these two aspects of competence is based on student development. They maintain that performance is what a student *does*, whereas competence is what a student *is able* to do (italics in original). They propose the view that there is a continuum of performance, from performance-based criteria that are observable, task-dependant and require low cognitive effort; through to competence-based criteria that include underlying competencies, are task-independent and require high cognitive effort. Therefore, they conclude that performance-based criteria are likely to be more

beneficial to students earlier on in their learning than competency-based criteria as they are directly observable, clearly specify what is to be assessed and require less mental effort.

Branch's (2014) study of pharmacy students poses a similar idea with a four level competency assessment pyramid which takes learners through a hierarchy from "know", "know how", "show how", and "do". However, she reverses the order of competence and performance and asserts that the third stage, "show how", should be referred to as competence rather than performance as it requires the learner to demonstrate that they could perform in a simulated environment, whereas "does", which is the highest stage, can only be demonstrated by performance in a complex, everyday situation (Branch, 2014, p. 23).

Van Tartwijk and Driessen (2009), promote a similar concept to Branch (2014), with Miller's (1990) pyramid as an assessment of clinical competence for medical practitioners. This model outlines a hierarchy of competence, from knowledge through "Knows how" and "Shows" to "Does" at the top of the pyramid. The attribute "Does" represent "independent performance within the complex environment of day-to-day practice" (Van Tartwijk & Driessen, 2009, p. 791). A portfolio was identified by these authors as a means to authentically assess performance at this "does" level. Paulson, Paulson and Meyer, (cited in Çardak, & Özönay Böcük, 2015) identify portfolios as "purposefully collecting the students works (sic) which reflect their performances, development and success in a specific context" (p. 2015). Shepherd and Hannafin (2013) propose that "portfolios are collections of purposefully selected materials, organised to depict and examine professional practice (Shepherd & Hannafin, 2013, p. 34). Buckley, Coleman and Khan (2010), note that this portfolio assessment method has increased in recent years, due to an "increasing emphasis on reflective, competency-based practice" (p. 188).

There are key features of evidence portfolios that make them a suitable method to assess professional competency in a workplace environment. For instance, Buckley et al. (2010) found that portfolios improved students' abilities to integrate theory with practice, and encouraged self-awareness and reflection. Furthermore, Jones (2010) described a number of benefits of portfolios as an assessment method, including:

- greater student responsibility for their learning
- better integration of theory and practice
- enhanced student reflection

Students in a study by Henderson, Davis and Day (2015) found that the benefits of portfolios included enhanced peer collaboration and self-evaluation. Reflection was shown by Van Tartwijk and

Driessen (2009) to be one of the strengths of portfolios while Buckley et al (2010) found that a study of the use of portfolios across a range of professions showed they were effective in helping students to identify their learning needs; improve their knowledge and understanding; and to integrate theory with practice. Lai-Yeung (2011) found that the use of portfolios resulted in a more personalised or individualised learning approach with individual students having “unique, individual and personal” learning journeys (Lai-Yeung, 2011, p. 4). Askit (2016), in a study on the use of portfolios in teacher training, discovered that portfolios allow more choice or flexibility by allowing students freedom to express their individual differences. The study found that this freedom promoted the students “intellectual autonomy and self-respect” (Askit, 2016, p. 120). Portfolios are thus claimed to be a valid and authentic method of assessing professional workplace competency, in that they foster self-reflection and improve students’ abilities to integrate theory with practice.

The specific characteristics of adult learners discussed in section 2.1 – such as the need for learning to be applicable to and integrated into learners’ daily lives, and the need for knowledge to be constructed rather than acquired – mean that the use of portfolios as an assessment method for adult learners is likely to also promote learning. The features of portfolios discussed above, particularly aspects such as the integration of theory and practice; peer collaboration and self-evaluation; greater student responsibility for their own learning; the ability to personalise or individualise a learning journey; and the enhanced choice and flexibility portfolios offer, indicate that portfolios are likely to offer adult learners a learning and assessment experience that is well suited to their needs.

The validity and reliability of portfolios has been debated, although Shepherd and Hannafin (2013) note that there has been minimal research in this area. The crux of the validity debate around portfolios as an assessment method appears to be one of content. Where learners have a large degree of freedom as to what they use as evidence in the portfolio, there is likely to be more uncertainty about the validity or otherwise of that evidence (Dannefer, Bierer, & Gladding, 2012; Michels, Avonts, Peeraer, Ulenaers, Van Gaal, Bossaert, & De Winter, 2016.). Nevertheless, Van Tartwijk and Driessen (2009) note that portfolios work better when students have some degree of control over the content.

It should be noted that the literature reviewed on evidence portfolios relates almost exclusively to professional occupations (mostly medicine and teaching) at undergraduate and post-graduate level. There appears to be a paucity of literature based on the use of portfolios in a vocational training environment.

This research is investigating the assessment of knowledge based on workplace performance. The intended outcome of this assessment methodology is that knowledge has been embedded into the workplace performance, rather than being treated as a separate entity. Therefore, learners will have a deeper understanding of the knowledge and its context, and will be better able to apply it to future problems or situations which they encounter in the workplace. This argument fits with Fastré et al's (2014) notion of competence being what a student is able to do, rather than what he or she does. It is hoped that the data gathered in this study will enable some conclusions to be drawn on how well this assessment methodology shows learners have gained that deeper understanding.

2.6 Conclusion

Notably, there is minimal literature related to assessment of workplace-based learners in a VET environment. The literature that relates specifically to VET situations tends to be about learners who are institution-based. There is a dearth of literature about competency-based assessment of VET learners who are based primarily in the workplace.

It is acknowledged that institution-based learning, that includes real-world and/or simulated practical experience, is a key part of the VET spectrum. However, a unique feature of ITO based VET in New Zealand is that learners are in full-time employment while they undergo their training, thus providing a real-world context for both learning and assessment.

New Zealand based research has been carried out relatively recently by Ako Aotearoa, about assessment of learning in the workplace (Vaughn & Cameron, 2009). This paper acknowledges that "there is very little international and New Zealand research on learning (and assessment) in on-job settings" (Vaughn & Cameron, 2009, p. 2). It also notes that in examples of key research in Australia and the United Kingdom on VET training practices, very little, if any mention is made of assessment. It further argues that much of the assessment that takes place in the VET sector is summative and focussed on recognising or credentialing the learning that has been done. Some of the perceived value of authentic, workplace-based assessment is that it is formative assessment and plays a significant role in the learning process. Vaughn and Cameron (2009) conclude that not only does workplace assessment ensure authenticity; it is also potentially valuable as formative assessment.

Subsequent to Vaughn and Cameron's (2009) paper, a guide to assessment structures and systems for ITO's was produced (Vaughn & Cameron, 2010). This guide was built around four key principles:

- Principle 1: ITOs and workplaces should have a clear purpose for assessment and work together.
- Principle 2: The ITO's assessment structures and systems must support the learning process.
- Principle 3: Good assessment requires appropriately recruited, trained and professionally developed people.
- Principle 4: Moderation contributes to the validity and reliability of assessment decisions.

While this guide offers some research-based guidelines to (and examples of) good practice assessment in workplace situations, it is focussed on the systems and structures that are in place for the assessment process rather than the assessment methodology itself. Neither does it profess to judge the effectiveness of workplace-based or on-the-job assessment.

Finally, the New Zealand vocational qualification system, via the TRoQ instigated by NZQA in 2010, has meant a fundamental redesign of the way qualifications are constructed. The post-TRoQ qualifications are designed around graduate outcomes that cover the cognitive, psychomotor and affective domains of learning. The primary industry sector, along with some others, has taken the opportunity to review how trainees' learning is assessed, and has tried to develop an assessment methodology that better integrates these three domains. The motivation for this has been to produce graduates that are better able to demonstrate well-rounded capabilities and an ability to adapt to fast-changing workplaces, rather than to continue to assess skills and knowledge in isolation to each other, and treat competence as an historic event, instead of a dynamic state.

This research offers an opportunity to study authentic assessment in a different setting from most previous studies. In particular, it seeks to investigate how effectively learners' knowledge has been embedded into their workplace performance, and how well the new assessment methodology captures this.

Chapter 3: Study design and methodology

3.1 What type of research?

One key distinction between qualitative and quantitative research is the form in which data are generated. Quantitative research gathers data that are in the form of numbers, while qualitative research gathers data that are not in numerical form – which usually means words. Quantitative research generally gives definitive answers to research questions and tends to focus on the data and associated conclusions, rather than the participants themselves. Qualitative research may provide answers to research questions, but will often also pose further questions. This kind of research will generally have a far greater depth of narrative and will focus on the human element, which is likely to generate data that are richer and more in-depth. Stake (1995) makes a distinction between qualitative and quantitative research as seeking to explain, and find causes (quantitative); and seeking to understand (qualitative) as being the purpose of the enquiry.

Based on the type of data this study will generate, a qualitative approach is the obvious option. The study is seeking to gain an understanding of the participants' thoughts and opinions and what influences these, as well as make a comparison between old and new methods – which will be in the main, subjective. The purpose of the research is not to definitively answer a research question, but to gather data from participants that will help us to understand what is happening, how it affects the people involved in the study and what this may mean in a wider context. Again, based on these aspects of the study, a qualitative approach is indicated.

3.2 Research questions

This study is researching the following questions:

(A) How does an integrated theory and practical assessment approach compare with traditional, separate written and practical assessment methods, from a learner's, an employer's and an assessor's perspective?

(B) To what extent has this integrated assessment approach enabled learners to apply theoretical knowledge they have learned to practical workplace situations?

The conclusions drawn from the data will seek to provide answers to these questions. In addition, the reasoning and the human context of the three different perspectives of the participants will evoke further questions and thinking to allow work to evolve in the area of integrated assessment.

3.3 Evaluative case study

Qualitative research has a number of different approaches, of which case studies, ethnographic research or action research are three examples. Yin (2009) compares five research methodologies: experiment, survey, archival analysis, history, and case study, and discusses methods of determining which one is most appropriate to a particular circumstance. Experimentation is more about the researcher being able to manipulate variables, thus creating a degree of control over the environment. This researcher control is a clear distinction from a case study which relies on non-interventionist methods and retaining the “real life “context of the case (Yin, 2009). Histories are dealing with the past, so mostly rely on document analysis. There is no control over, and no access to participants.

Case studies generally examine contemporary, rather than historic events; they do not attempt to intervene or manipulate but rather study phenomena in a real context. Researchers also have access to participants – both through observation of behaviour and interviews or surveys. Punch (2009) describes a case study as something that aims to “understand a case in depth and in its natural setting, recognising its complexity and its context” (Punch, 2009, p. 119). Cresswell (1998) defines case study as “an exploration of a bounded system or a case over time through detailed, in-depth data collection, involving multiple sources of information, rich in context”.

Yin (2009) asserts that case studies are the preferred method when:

- “how” or “why” questions are being posed;
- the investigator has little control over events;
- the focus is on contemporary phenomena (not historic), within a real-life context.

Common themes from most authors seem to agree that some of the special features of case studies are:

- I. They are bounded, i.e. an individual case study has distinct boundaries which could include participants, timeframes, geography, purpose, or topic. In some way, each case is a defined “thing” that may be studied.
- II. They are studied in their natural setting or context. They are not, for example like an experiment where, even though both may be exploratory, an experiment requires researchers to have control over at least some of the variables, and often over the whole event.
- III. They are done in depth. A case study requires in-depth study of phenomena in order to understand, rather than to explain or determine cause and effect.

A case study is relevant when the research is trying to find out about how individuals, groups or communities think, feel, behave and act. This research is about perceptions. The intent is to gain an understanding of how the participants feel about a different method of assessment, their views on how well it works, and how it compares to a previous method. The research is studying a group of people who are operating within a normal, real-life context, and as such attempts to understand, rather than to quantify or justify results that the data may show. For these reasons, an evaluative case study is the most appropriate method of conducting this research. Stenhouse, cited in Bassey (1999) defines evaluative case study: “a single case, or collection of cases is studied in depth with the purpose of providing educational actors or decision makers (administrators, teachers, parents, pupils etc.) with information that will help them to judge the merit and worth of policies, programmes or institutions” (p. 28).

3.4 Limitations of case studies

One limitation of case study research is that, unlike other research methods such as experiments, they are unlikely to establish causal relationships (Yin, 2009, p. 16). While this assertion is largely accurate, it is well understood and generally case studies do not pretend to answer the cause and effect question. A second criticism of case studies is that they lack rigour (Yin, 2009). Houghton et al. (2013) discuss the notions of dependability, credibility and confirmability as criteria to determine the rigour of case studies. These researchers define credibility as referring to how believable and credible the research findings are; dependability as being similar to reliability in quantitative research, referring to how stable the data are; and confirmability as being about the neutrality and accuracy of the data (Houghton et al., 2013, p. 12 – 13). They propose a number of strategies to determine rigour, based around these criteria.

Table 2: Strategies to determine rigour	
Approaches to rigour	Strategies
Credibility	prolonged engagement and persistent observation triangulation peer debriefing member checking
Dependability	audit trail reflexivity
Confirmability	audit trail reflexivity

(Adapted from Houghton et al., 2013, p. 13)

The strategies employed in this case study to ensure rigour include:

- Prolonged engagement, as participants were involved in the study for five months, and participated in an in-depth interview, as well as self-reflection during this time period.
- Triangulation, as discussed in section 3.6.
- An audit trail or “chain of evidence” approach to data collection, which ensures other researchers would have an opportunity to evaluate the raw data and reach similar conclusions. This is discussed further in section 3.6.

Probably the most discussed limitation of case study research is the inability to generalise from the results. Stake (1995) acknowledges this and states “the real business of case study is particularisation, not generalisation” (p. 8). He argues though that due to the depth of study involved in a case study, generalisations may be able to be modified or strengthened over time.

Punch (2007) also acknowledges that generalizability is seen as a limitation of case studies as they may be based only on one case. He argues that generalisation should not necessarily be the aim of a case study (or indeed any research). However, he goes on to add that there are ways a case study can produce results that may be generalised. One way is to conceptualise, whereby a researcher develops concepts to explain what has been observed as a result of the study. These concepts are likely to be applicable to further, similar case studies. Secondly, one may generalise by developing propositions, or hypotheses that have resulted from the case. These processes may also be applied or transferred to other cases to be further tested (Punch, 2009).

Yin (2009, p.15) has a similar view when he talks about case studies being “generalizable to theoretical propositions”. A case study is not a representative sample. The goal of case study

research is to expand and generalise theories. Punch (2009) goes on to propose that the need to generalise will depend on whether the purpose of the research is to focus on the uniqueness of a particular case, or on what is common with other cases. He further asserts that “when generalizability is a goal, and we are focussing on the potential common elements in a case, it is necessary for the analysis of the case study to be conducted at a sufficient level of abstraction” (Punch, 2009, p. 121-122).

While this particular research is not seeking to be able to produce results that will be generalizable in a wider sense, there is significant alignment in the data across all three sets of participants to generate some confidence that the conclusions reached from this study could be applicable in a wider context.

3.5 Data collection and types of evidence

While different authors have slightly divergent views on data collection methods or types of evidence for case study research, they all largely agree on the sources of data. Bassey (1999) outlines three major methods of collecting data: asking questions, observing events, and reading documents. These three methods are more commonly known as interviews, observation, and documentary data (Punch, 2009).

Yin (2009) takes things further with his suggestion for six types of evidence: documentation, archival records, interviews, direct observation, participant observation, and physical artefacts (although he acknowledges the last one has less relevance in most case studies). Based on the above discussion it appears that data collection methods or types of evidence for case studies can be loosely grouped into three broad categories:

A. Documentary evidence

These could be documents closely related to the participants of the study such as diaries, personal notes, biographies or autobiographies, letters or email correspondence and suchlike; or they could be less directly related documents such as studies or evaluations of similar cases and news articles.

Yin (2009) proposes several strengths of documentary data, in that they are:

- stable, and can be viewed repeatedly;
- unobtrusive i.e. they are not created as part of the case study;
- exact and have broad coverage.

A significant weakness however, of documentary data is that it may not always be able to be taken at face value, so separating fact from opinion, from fiction or misleading documents, or recognising bias may be significant challenges for researchers.

B. Interviews or asking questions

Interviews can be conducted in a range of formats, from more structured or formal through to unstructured or open-ended interviews. The type of interview utilised by the researcher will depend on the type of research being conducted, and what type of data the researcher is trying to elicit from the participants. Punch (2009) offers a continuum model for interviews with structured interviews, through focussed or semi-structured interviews to unstructured interviews (Punch, 2009). Structured interviews are highly planned and standardised. Data from the interviews are put into pre-coded categories and the interviews typically do not go into much depth. At the other end of the spectrum, unstructured interviews do not consist of pre-planned, standardised questions, but rather general questions to initiate a discussion. Further questions are likely to be determined depending on how the interview is unfolding, and the interview is likely to be more in-depth. Focussed, or semi-structured interviews enable some pre-planning of questions and data categories to ensure sufficient data are captured. Semi-structured interviews allow participants to drive the direction of the interview to some extent, discuss ideas in more depth than a structured interview, and in a more organised and disciplined manner than an unstructured interview (Punch, 2009).

The type of interview or questioning technique used by the researcher will depend on the type of research being done, the depth of information being sought and the number of participants being interviewed. Interviews may be done individually with the interviewer or they may be conducted as group (or focus group) interviews. Each of these approaches has their strengths and limitations. Individual interviews are designed to elicit responses about what people think, or how they feel about specific phenomena. Advantages of using an individual approach are that an interviewer is focussed solely on the person being interviewed and is more likely to get responses that are not influenced by others. One on one interviews are also more likely to work better for individuals for whom an interactive group environment is a less comfortable situation. Conversely, while a group interview, may be a less comfortable environment for some people and runs the risk of not being able to explore individuals thoughts or feelings in more depth, a group dynamic can often stimulate discussion and encourage participants to voice their views or thoughts that they may not have done individually (Punch, 2009).

C. Observation

In a similar manner to interviews, observational data may come from different methods. Punch (2009) describes structured and unstructured approaches to observation. Unstructured or “naturalistic” observation is non-interventionist, where the observer does not manipulate or stimulate the behaviour being observed. A more structured approach has the observer as a participant in the situation, although the degree of active participation may vary on a continuum with a researcher in a more participant role, while being an observer; or mainly as an observer with less of a role as a participant. Wolcott (in Punch, 2009) notes that the researcher can range from an active participant, through a privileged observer to a limited observer, with each step having less active participation in the situation being observed. More active participation may allow the researcher a greater insight into what is happening, and to observe behaviour or events that they would not have otherwise been able to; however there is also a greater possibility that, through their participation, what they are observing may be influenced by their involvement (Punch, 2009).

Yin (2009) describes a similar approach when he compares “direct observation”, where the researcher is merely observing phenomena in their natural setting – to participant observation, where the observer actively participates in events to some degree or other (Yin, 2009).

This study principally uses data gained from interviews with the participants. These are semi-structured interviews, designed to gather in-depth answers from the interviewees and allow them to more fully explore their thoughts, feelings and experiences in regard to the assessment methods. Due to the relatively large number of participants interviewed (23) and the need for some consistency of information from all the participants, the interviews need to have some structure and follow a similar format without restricting participants’ views. Having some structure to the interviews also enhances the reliability of the study as all participants views are sought on some key areas, meaning any conclusions drawn from these data are based on a larger sample. Similarly, this creates opportunities for some comparative analysis across the interviews, as again, there are a larger number of answers to similar questions to be able to compare.

There are also data in the form of documentation. There is documentation in the form of the assessment evidence portfolios to which all three participants; learners, employer/verifiers and assessors have contributed. This documentation underpins the information gained from interviews with participants. Observation has not formed part of the data for this case study as the researcher has not been present during the period of the case study. This study is seeking to discover the thoughts and perceptions of the three groups of participants on a changed assessment process.

Direct observation of the participants in this instance would not have yielded significantly different data, and would have been unrealistic from a logistical perspective.

3.6 Validity and integrity of data, and triangulation

Having more than one form of data is important to ensure the validity and reliability of the research. Yin (2009) outlines four common tests for validity of empirical research, including case studies. Of these, two are of relevance to an evaluative case study such as this;

- construct validity – which relate to operational procedures of the research; and
- reliability – which proposes that the same results would be obtained if the study were repeated.

Triangulation is a key means of ensuring the validity of the study, and can be broadly defined as the process of using more than one approach to researching a question. By using multiple sources of information it is more likely that bias will be avoided. Heale and Forbes (2013) suggest that the most common form of triangulation is methodological triangulation. This relates to different sets of data being collected using the same methodology – interview and documentary data analysis.

Patton (2001) refers to several types of triangulation that are pertinent to this study:

- I. Data Triangulation – the use of different data sources or types (e.g. interview, documentary data analysis).
- II. Investigator Triangulation – using different evaluators of the data (e.g. trainee, farmer, and assessor).
- III. Theory Triangulation – applying different perspectives or theories to the data.

There are two triangulation aspects to this study. Firstly, there are three different sources of data that have been collected. These relate to the three different types of participants that form part of this study; the Trainees, the Verifiers and the Assessors. Each of these participants will have a different perspective on the research questions. Secondly, there are two different types of data that have been considered. Data has primarily come from the semi-structured interviews with each of the participants; however there is also documentary evidence, in the form of the assessment evidence portfolios of the learners. These evidence portfolios have had input from all three of the participants. In addition, the literature review contains documentary evidence related to this study.

Yin (2009) also looks at the creation of a case study database. The principle here is separating raw data and the reports or narrative of the researcher. This process allows other researchers to investigate the raw data directly, rather than being limited to case study reports. This, Yin argues, will increase the reliability of the case study. Yin's third principle is maintaining a chain of evidence. By doing this, Yin argues that an external investigator would be able to follow the evidence through from the initial research questions through to the ultimate conclusions of the study. Yin likens this to the principles of a forensic or criminal investigation, where the conclusions reached would be able to stand up in court based on the integrity of the data. Data integrity will also increase the reliability of the research (Yin, 2009).

In terms of reliability in the current study, the collection of raw data in the form of voice recordings of interviews, and the chain of evidence that has led to any conclusions or recommendations as a result of the analysis of the data, has been carefully maintained. Each verbal interview recording was transferred into an interview summary document. These summary documents have been collated into data coding tables for each group of participants (see Appendix E) and further analysed and displayed in a chart of common categories and themes across the participant groups (see Appendix F). This document process will allow other investigators to view the study at any point and be able to trace the process from raw data through to conclusions.

3.7 Ethical issues

There are a wide range of ethical considerations that need to be taken into account when designing and conducting a study such as this. Punch (2007) outlines a range of potential issues that may need to be considered at various times throughout a research project and other authors such as Anderson and Arsenault (1999) cover similar issues.

Massey University has a Code of Ethical Conduct for Research under which this study was conducted, which lists the following ethical principles:

- a) Respect for persons.
- b) Minimisation of harm to participants, researchers, institutions, and groups.
- c) Informed and voluntary consent.
- d) Respect for privacy and confidentiality.
- e) The avoidance of unnecessary deception.

- f) Avoidance of conflict of interest.
- g) Social and cultural sensitivity to the age, gender, culture, religion, social class of the participants.
- h) Justice.

This study was carried out with reference to these principles. The only ethical issue with the potential to impact on this study was that of a possible conflict of interest. The researcher is a work colleague of the Training Advisers (Assessors) and it was important that the participants did not feel any undue pressure on them to participate in the study. This potentiality was mitigated by the fact that the researcher and the Training Advisers do not sit in the same chain of command within Primary ITO. The researcher reports to the General Manager of Standard Setting at Primary ITO, and the Training Advisers report to individual Regional Managers, who report to the General Manger of Field Operations. At the time of gaining approval for conducting the research, the General Manager of Standard Setting was also the acting General Manager of Field Operations, due to the resignation of the General Manager of Field Operations. A new General Manager of Field Operations has since been appointed. The researcher felt he was unlikely to have any relationship with any of the employer or trainee participants and if, once they had been identified, any of them had had any known relationship with the researcher that would cause a conflict of interest they would not have been included in the study. As the study progressed, it was determined that none of the Verifier or Trainee participants were previously known to the researcher, and no conflicts of interest were identified.

3.8 Summary

Based on the research questions that guide this study, and the type of data being captured, a qualitative approach using an evaluative case study was determined to be most appropriate. Some limitations of case studies, in the context of this research, were identified. Methods used to ensure rigour were explained as the prolonged engagement of the Trainees in the study, triangulation of data, and a “chain of evidence” approach to the data collection and analysis (Yin, 2009). Semi-structured, in-depth interviews with the participants were identified as the most appropriate data collection method. The importance of the validity and integrity of the data was discussed and triangulation, along with the maintenance of a chain of evidence approach to the data was outlined as a means of ensuring this validity and integrity. Finally, potential ethical issues for this research and the means to mitigate these were addressed.

Chapter 4: Practical application of the research

4.1 Sampling

It was identified in the design phase of this study that the number of participants needed to be large enough to give sufficient data and to allow for a possible loss of participants throughout the study, but a small enough number to ensure that the data collection and analysis were manageable. Two separate cohorts of participants were deemed to be required and that these should be geographically separated, ideally with one in the North Island and one in the South Island. The rationale was to ensure a suitably diverse group of participants.

The sampling of the participants was carried out using the following process:

- I. Approval was gained from the Primary ITO General Manager of Field Operations to request the voluntary participation of Training Advisers, and trainee and employer clients in the study. This was obtained on September 15, 2015. (see Appendix G)
- II. Ethics approval for the study was gained from the Massey University Human Ethics Committee, on December 3, 2015. (see Appendix H)
- III. The Primary ITO Regional Managers were contacted on December 4, 2015, by email, requesting that they make the Training Advisers in their teams aware of the study that was being proposed and give them an opportunity to respond directly to the researcher if they were interested in being involved.
- IV. Expressions of interest were received from three Training Advisers; two in separate regions of the North Island; and one in the South Island. These were followed up by the researcher. These Training Advisers were first contacted by phone to confirm their interest, and then by email. The email included two documents giving details of the research project from the point of view of Training Advisers, in order to identify suitable participants (see Appendix I); and from the point of view of participants (see Appendix J). The Training Adviser document detailed the criteria by which to identify participants who were potentially suitable to be involved. In summary, these were that participants should have previously been enrolled in one of three specific National qualifications with Primary ITO in 2015 or 2014; they should be enrolled in one of three specific New Zealand qualifications with Primary ITO in 2016; they should express a willingness to be involved; and their employer or workplace supervisor should also be willing to participate.

- V. The three Training Advisers responded with potential trainees/employers who met the criteria and who had verbally expressed a willingness to be involved. Four Trainees were identified from one of the North Island regions; seven Trainees were identified from the second North Island region; and eight were identified from the South Island region. Based on this response, the North Island region with the greater number of trainees, along with the South Island region were identified as the most appropriate areas to conduct the study. This process ensured that there were sufficient numbers of participants involved to generate sufficient and robust data, even allowing for the potential loss of some participants throughout the study. It also met the desired criteria of having two geographically diverse locations, one in the North Island and one in the South Island.

4.2 Realities of data collection in the field

4.2.1 Initial field visits

The researcher visited the participants in each area; the South Island location on April 6-7 and the North Island location on April 20-21, 2016. During these visits, the study was explained verbally. The participants were given the “information for participants” document (see Appendix J) and were given the opportunity to discuss the study further with the researcher and ask any questions. They were then invited to confirm their involvement and sign a consent form.

In the North Island cohort, seven trainees indicated a willingness to participate. All were visited on April 20 and 21, and all signed consent forms. In the course of the interviews, it was discovered that one Trainee would be changing jobs at the end of May. He would be in a new job in the South Island from June 1, and his current employer would be leaving the country at the end of May so could not participate. This meant that this Trainee was not able to be part of the study.

Six employers had indicated a willingness to participate in the North Island cohort. One could not, as noted above. Of these six, five were visited on April 20-21 and signed consent forms. One employer was unavailable on those days, but was subsequently contacted by phone and agreed to participate. His consent form was left with his Trainee to be collected by the Training Adviser. There was one Training Adviser responsible for these trainees and employers. This Training Adviser agreed to participate and signed a consent form. At the time of the initial visits, the participants were informed that the final interview visits would take place during the last week in June or first week in July, to ensure interviews were completed prior to the busy calving period.

In the South Island cohort, eight Trainees indicated a willingness to participate. Six Trainees were visited on April 6-7, and all of them signed consent forms. Two Trainees were not available on the day but were contacted the following week by phone and agreed to participate. Arrangements were made for one of the Training Advisers to collect their consent forms. At the interviews, it was noted that one Trainee would be changing jobs at the end of May. However, they would still be in the area and their current employer was still happy to be involved, so while they were not in an employment relationship at the time of the interviews, they would still be valid participants.

Seven employers had indicated a willingness to participate in the South Island cohort. Six were visited on April 6-7. One was not available on those days, but was subsequently contacted by phone and agreed to participate. Arrangements were made for one of the Training Advisers to collect their consent form. One employer was not suitable to participate, as their current employee is the first Primary ITO trainee they have employed, so they have no knowledge of previous assessment methods with which to compare the current one. There were three Training Advisers who cover all these trainees and employers. They all agreed to participate and have signed consent forms. At the time of the initial visits, the participants were informed that the final interview visits would take place during the last two weeks in July, to ensure they were completed prior to the busy calving period, which is 2 – 3 weeks later in the South Island.

4.2.2 Final field visits

There was a reduction in the number of participants between the original visits, where consent was obtained, and the number from whom data were finally obtained. These changes are summarised in Table 3 below. Initial visits to the participants were carried out to inform them of the details of the study, invite them to participate, and obtain their consent via a signed consent form. In the North Island, consent forms were obtained from one Assessor, seven Trainees and six Verifiers. In the South Island, consent forms were obtained from three Assessors, eight Trainees and seven Verifiers. Subsequent to obtaining these consent forms, two Trainees and two Verifiers were no longer able to participate due to changes in employment circumstances, or enrolment in the qualification.

Some of the participants were either not available at the time of the final interview visits, or data were unable to be gathered from them due to their lack of engagement with the training programme. For those participants not available at the time of the final interviews, arrangements were made to conduct the interviews at a later date via phone or Skype, although these arrangements did not eventuate for two of the Trainees.

Whilst there was a reduction from the original number of participants who gave consent to participate in the study from 30, down to 23, this was still a sufficient number, spread across the two sites, and three participant categories to produce adequate data from which to draw valid conclusions.

Table 3: Summary of Participant numbers					
	Original Consent given	Number removed	Intention to interview	Number removed	Final number data obtained from
N.I. Assessors	1	0	1	0	1
N.I. Verifiers	5	0	5	2	3
N.I. Trainees	6	0	6	2	4
S.I. Assessors	3	0	3	0	3
S.I. Verifiers	7	1	6	0	6
S.I. Trainees	8	1	7	1	6
Total Participants	30	2	28	5	23

4.2.3 Interview technique

The researcher's interview technique was refined as the final field interviews progressed. Interviews were initially structured around the pre-determined interview questions (see Appendix L). As the first few interviews progressed, it became apparent that discussing the new programmes and associated EP first, then moving to a discussion about the previous method before making a comparison was not going to work. All participants, when asked questions about the new programmes and EP made direct comparisons with the previous method as part of that discussion. The researcher refined his technique to allow for this approach, and while the interviews remained semi-structured, the nature and order of that structure changed as the data gathering phase progressed. There were seven participants who had limited time available to participate in the interviews (less than 15 minutes), so these interviews became more structured as the interviewer focussed on obtaining answers to key questions in the limited time. Those interviews where time was not a factor tended to be more free-flowing and less structured. The average interview time across the three groups (Assessors, Trainees and Verifiers) was 19 minutes, with Assessors averaging 23 minutes; Trainees 17 minutes and Verifiers 18 minutes.

All interviews were voice recorded using an echo Smart Pen, as well as handwritten notes being taken. At the completion of the interview visits, all interviews were replayed and detailed interview summaries were created.

4.3 Ethical issues

This research was reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 15/71. There were no major ethical issues that were identified in the design of this study.

The only issue that was identified as a possible concern was that of the professional relationship between the researcher and the Training Advisers (Assessors). Although the researcher is a work colleague of the Training Advisers, they are in a different chain of command, and their voluntary involvement was approved by the General Manager of Field Operations at the time. There was no pressure for any of the Training Advisers to participate and they were fully informed of the aims and details of the study, and that they could withdraw at any point, with no adverse consequences.

None of the other participants were previously known to the researcher.

No other ethical issues arose during the research.

4.4 Data analysis

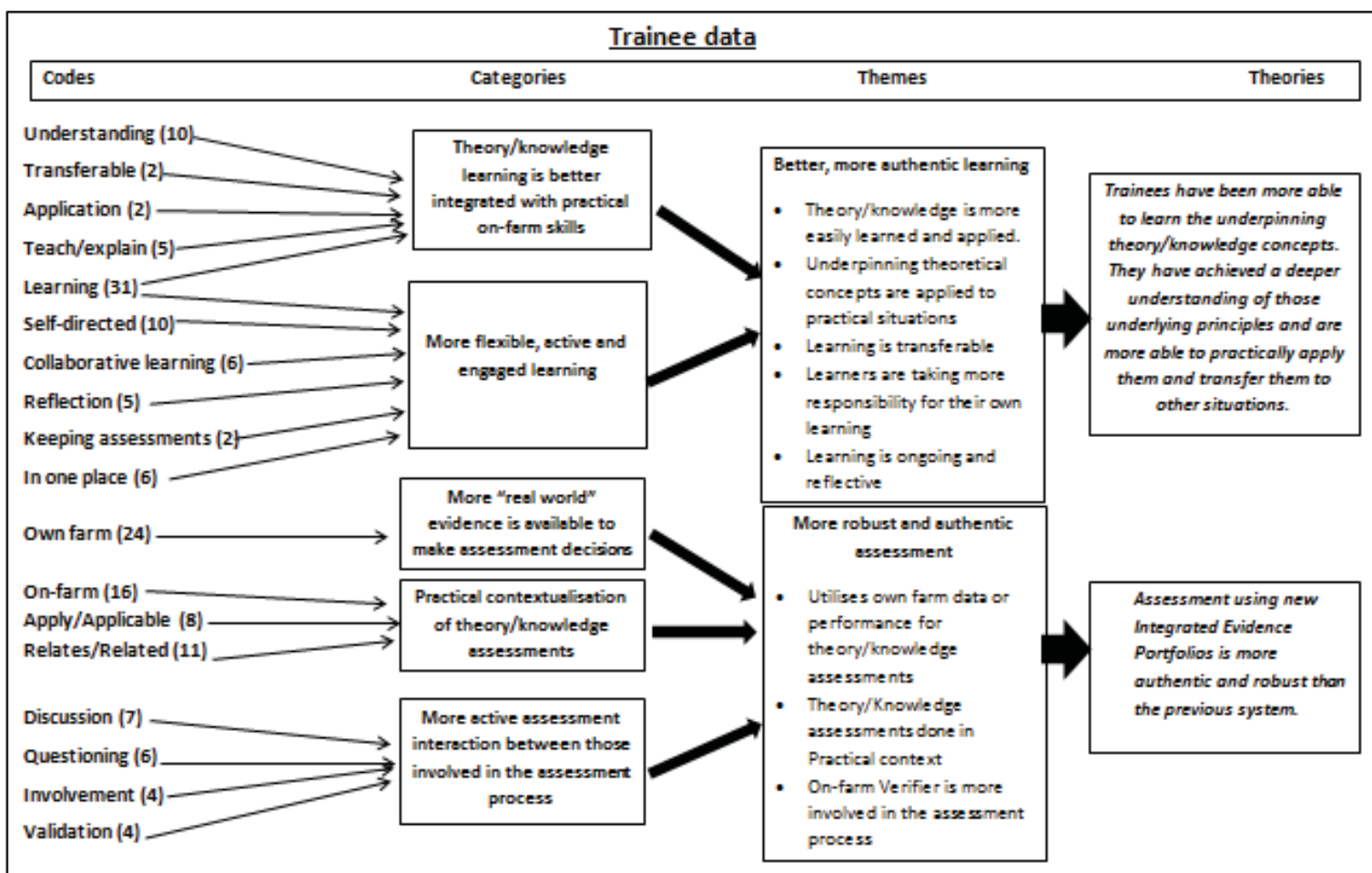
Participant interviews were transcribed. Detailed interview summaries for each of the Assessors, Trainees and Verifiers were used in the data analysis phase. Reference was made back to the original recorded interviews where necessary.

Because this was research on a newly introduced assessment system, data analysis was based on the research data (inductive) – not on literature review themes (deductive data analysis). The inductive data analysis methodology was based on a Constant Comparison Analysis technique (Leech & Onwuegbuzie, 2008), as well as the Miles and Huberman Framework for Qualitative Data Analysis, as described in Punch (2009). Data from the interviews were initially allocated open (topic) codes to enable the researcher to identify key themes and responses for further analysis (see Appendix E). The topic codes used in this phase were words that represented information in the data that were similar, or meant the same thing (e.g. the code “collaborative learning”, in the Trainee data analysis, was used to represent those examples Trainees’ gave when they felt they had benefited from

learning from their peers during class discussions). The words used for codes were not necessarily words that appeared in the interview data, or words that the participants used, they were a means of grouping data fragments (e.g. words, phrases or sentences) together according to the topic subject. These topic codes are defined in the tables for each data set (see Appendix F). Frequencies were identified to give an indication of the strength of the emerging codes.

Once the topic codes were defined, they were then grouped together (axial coding process) to develop relationships, referred to as categories (in Figure 1 below). Analytic coding (sometimes referred to as theme development) occurred next - a process of interpreting and reflecting on meaning, leading to theory emergence and affirmation (Richards, 2009). These themes were represented graphically in order to allow a more holistic view of the interrelationships between the codes, categories and themes (an example of this is shown in Figure 1 below and more comprehensively in Appendix F). To test the emerging theory, the categories across the three data sets (Trainees, Verifiers and Assessors) were then triangulated (see Table 4). The findings in the next chapter are based on the outcomes of this data analysis process.

Figure 1: Example of data coding chart



4.5 Limitations of the study

The final data collection phase highlighted some limitations of the study which will need to be considered in making the conclusions.

4.5.1 Time period of the study

The time period of the study was not as long as originally intended. The original intention was that trainees would have been enrolled in the programmes for 6 – 9 months before the final interviews were done. The implementation of these programmes was originally targeted for June 2015, however for a number of reasons, the decision was made by Primary ITO to put this back until January 2016. The researcher's deadline of November 2016 for completion of this Thesis, and the fact that the busy time of calving for dairy farms begins about late June in the North Island and mid-July in the South Island, meant that the final visits needed to be completed prior to the calving season beginning. These constraints meant that the longest possible time the participants could have had enrolled in the programme was 5 ½ months. Had implementation of the programmes begun as planned in June 2015, participants could have had up to 11 months in the programme. As a result of this shorter timeframe, it was found that in some cases, at the time of the final interviews, there had not yet been any Trainee/Verifier discussions, so those Verifiers were unable to provide any data. In virtually all cases, there had not been an Assessor visit with the trainees or the Verifiers who were participants in the study, so no data about that interaction could be obtained. The Assessors who participated in the study had however done a number of assessment visits with Trainees and Verifiers enrolled in the new pastoral programmes – just not with the participants of this study. While the participants in the study who were interviewed gave a lot of very rich data, it is unknown if that would have been different had they had longer to experience the training programmes.

4.5.2 Range of assessment attempted

Two of the four Assessors who participated in the study, had only done assessments for one of the new programmes (Livestock Feeding, the programme leading to the New Zealand Certificate in Pastoral Livestock Production) (Level 3)). Those Assessors had knowledge of the other programmes, and had trainees who were enrolled in those programmes; however they had not yet done any assessment visits for those programmes.

Chapter 5: Findings

5.1 Introduction

This chapter reports the findings of the study against each of the research questions:

(A) How does an integrated theory and practical assessment approach compare with traditional, separate written and practical assessment methods, from a learner's, an employer's and an assessor's perspective?

(B) To what extent has this integrated assessment approach enabled learners to apply theoretical knowledge they have learned to practical workplace situations?

Analysis of the interview data revealed six categories that were common across each group of participants– Trainees, Verifiers (employer/farmer) and Assessors – and which together summarise their shared responses to the introduction of a new EP assessment method.

The data analysis tables and subsequent summaries for each group indicated a high degree of alignment across the broad categories (an example of the data tables; and the data summaries are in Appendices E and F). These common categories are reported first, followed by important categories reported by one or two of the groups. Overall, eight categories were identified across the three groupings and of these; six categories were common to the three groups. One category featured in two of the three groups and one category was present in just one group. Reference will be made to interview extracts throughout the following sections to illustrate those categories.

The categories from the analysis of the Trainees, Verifiers and Assessor data are listed below in Table 4. The dark shading indicates a category that is common across all three groups. Where a category is present in two of the three groupings, it is indicated with light shading and where a category is only reported by one group, it is left unshaded.

This chapter presents the eight key research findings from the study. The first section presents the six findings that were common across all three participant groups. These six findings (as shown in Table 4) are explicated in sections 5.2 – 5.7. Following that, the findings that were common across two of the participant groups will be presented. Finally, the one finding identified for one participant group only is presented. A summary of these findings in relation to the research questions concludes the chapter.

Table 4: Data triangulation across the three groups			
Category	Trainee data	Verifier data	Assessor data
Theoretical knowledge learning is better integrated with practical on-farm skills	✓	✓	✓
More flexible, active and engaged learning	✓	✓	✓
More “real world” evidence is available to make assessment decisions	✓	✓	✓
More active assessment interaction between those involved in the assessment process	✓	✓	✓
Greater satisfaction and enjoyment with new assessment method	✓	✓	✓
Practical challenges of change	✓	✓	✓
Practical contextualisation of theoretical knowledge assessment	✓		✓
Verifiers have greater understanding and clarity of theoretical knowledge Trainees are learning		✓	

In Table 4 the first six categories were common across all three participant groups. These six categories are explicated below (5.2 – 5.7).

5.2 Integration of theoretical knowledge learning with practical on-farm skills

A key finding from the study was the view from Trainees, Verifiers and Assessors that the new EP enabled the Trainees’ learning of theoretical knowledge underpinning the programme to be better integrated with the development of practical on-farm skills than the previous assessment method had allowed.

The new EPs were designed to ensure Assessors were better able to assess Trainees’ skills, knowledge and behaviour more holistically and in a workplace context. This benefit differs from the previous system of an on-farm work diary and written assessments of theoretical knowledge based on the Trainees’ classroom learning.

The new EP allows for one Assessor, where previously there had been two Assessors, to oversee all the evidence for the Trainee, and make an assessment decision based on that evidence. The Tutors had assessed the theoretical knowledge unit standards, using (mostly) written, short answer assessments (see Appendix L). The Training Advisors had assessed the practical unit standards using the work diary (see Appendix D), and an assessment discussion with the Trainee and Verifier. The Tutor had no oversight of the practical assessment process, and the Training Adviser and Verifier had no involvement in the theoretical knowledge assessment process. Consequently, assessments of competence were discrete and somewhat isolated across the different types of unit standards.

The new EP enables a holistic assessment decision to be made based on a learning outcome which incorporates evidence of skills, application of knowledge, and workplace performance. Such integration aligns with the intent of the new qualifications in assessing graduate outcomes that encompass the skills, knowledge, and attributes of graduates of the qualification (see Appendix E). In this excerpt in appendix E, note that Activities 25 and 26 are “signed off” by the Verifier, on farm, and Activity 27 is signed off by the Tutor. The Assessor is able to make the overall decision for Learning Outcome 10.1, based on the evidence in the EP from both the Tutor and the Verifier. This assessment process would also incorporate a discussion with the Verifier and the Trainee, and if necessary, the Tutor. Triangulation across the triad ensures a more dependable and credible assessment judgment.

5.2.1 Application

The new EP offered more opportunities for Trainees to make strong connections between the theoretical knowledge being learned in the classroom and the practical skills being learned on farm. Being able to apply the knowledge the Trainees had gained in the classroom to related practical tasks on the farm helped to develop a deeper understanding of the knowledge but also supported their practical performance.

The Assessors felt that the Trainees were relating theory and knowledge learned on the programmes to their farm work. This theory/practice connection was evident in the words of Assessor Y who said: *“It makes it easier for them to learn it. They are practical people and they are relating it...every day”*. Similarly, the Trainees talked about their heightened ability to relate theory and knowledge to their farming practice. Trainee 3 provided an example of learning about mastitis treatment in class and being able to apply it on a daily basis to what was happening on-farm. In addition, Trainee 4 noted that learning about feed allocation for cows in class helped make sense of it on the farm. *“It keeps it fresh in your mind. It’s actually relevant when you are doing it on farm”*.

The Verifiers also spoke of the greater link between theoretical knowledge and practice afforded by the EP. Examples from the Verifiers included the knowledge assessment for environmental activities. For instance, Verifier X thought that the environmental assessment was very applicable to the on-farm situation and that making these theoretical and practice connections had helped the Trainee to realise why environmental activities were happening on the farm. Another example was provided by Verifier D, who noticed that learning the theory of feed allocation and pasture growth had improved their Trainee's practical performance.

These data provide strong evidence that improved practical on-farm performance links to developing a deeper understanding of underpinning theoretical knowledge. These comments indicate key differences between the previous assessment method where the theoretical knowledge and practical assessments were done separately, and the new EP.

5.2.2 Integration

The new EPs gave Trainees more opportunities to integrate the theoretical knowledge and practical aspects of their learning into a greater cohesive whole. This more holistic view is a key aspect of the EP design, and of the graduate outcome requirements of these programmes leading to the new New Zealand qualifications. These qualification outcomes are seeking evidence of the psychomotor, cognitive and affective domains (what a graduate can know/do/be), and to take a holistic assessment view to achieve this means that integrating the theoretical knowledge and practical aspects of those outcomes is important. Agreement was widespread across the three groups of participants that the new EPs had a positive effect with respect to this holistic assessment view. Assessor W felt that the new EP better integrated theory and practical requirements. *"Theory and practical work more hand in hand because it is right there. You are completing them at the same time in the book."* Assessor X observed that in the previous assessment system the theoretical knowledge and practical were separate, but that under the new system one cannot be done without the other.

This theme of better integration of the theoretical knowledge and practical learning also came through quite strongly from the Verifiers. The Verifiers generally thought that the new EP assessment system did a good job of integrating the theoretical knowledge and practical components of the programmes and that this integration was important in helping the Trainees achieve. The Verifiers particularly liked the way the EPs utilised information from their farms as part of the theoretical knowledge assessment. They believed this was an important part of integrating the theoretical knowledge learning with the practical dimensions. Verifier D gave an example of how they were having milk quality problems with high somatic cell counts at the time the Trainee was

covering the theoretical knowledge about milk quality in class, so the assessment the Trainee was doing was based on what was actually happening on-farm. This Verifier believed, in general, that having the theoretical knowledge assessment utilising on-farm information was a key advantage of the new EPs and commented that *“it has more value in it and is better landed on the real life”*. By integrating the theoretical knowledge with the practical, Verifier G found that the new EP helped their Trainee understand the on-farm practical realities do not necessarily happen according to the theory. *“There seems to be a lot more cross-referencing between farm and class than in the past”*.

The Trainees also thought there was better integration of theoretical knowledge learning with practical skills. Trainee 3 thought the learning in class was “directly applicable” to what was happening on the farm; while Trainee 9 thought they had learnt the theoretical knowledge better than their last course as *“it was more practical. It was more about what’s going on on **our** farm”*.

5.3 Learners are more flexibly and actively engaged with their learning

A key finding from all three sets of participants was that Trainees were more engaged in their learning than they had been under the previous assessment system; they were more active in constructing their learning; and that the learning was more flexible. This resulted in Trainees finding the learning easier to cope with and often resulted in better or deeper understanding of the theoretical knowledge concepts they were learning.

5.3.1 Active engagement with learning

The study found that there was more active engagement from Trainees in their learning using the new EP assessment system, than there had been in previous programmes. This active engagement indicated a greater enthusiasm for learning and a higher level of intrinsic motivation from the Trainees which seemed to be connected to the fact that the practical context of the theoretical knowledge learning was clearer and had more meaning to the Trainees. The Verifiers noticed that the Trainees were asking them more questions, and there was noticeably more involvement and effort from the Trainees than in the past. Verifier A noted that their Trainee was asking better questions of them, which was reinforcing the classroom based learning. Verifier E also noticed that their Trainee was asking a lot more questions under the new system and felt that they were more engaged than they had been in their previous course.

The Assessors also noticed a similar improvement in Trainee engagement with their learning than had been evident under the previous system and believed that the Trainees were taking a more

active role in their training. Assessor Y commented that compared with the previous system the new EP method required Trainees to think a lot more, *“get out and find [more] answers”*, take more pride in their EPs, put in a lot more effort, and were *“definitely more engaged”* in the training than previously. Assessor Z also believed that the Trainees were much more engaged in their learning and were asking more questions.

From the Trainees’ perspective, it was evident from the data that they felt more actively engaged in their learning also. Six of the 10 Trainees commented on self-directed aspects of their learning. Trainees 1 and 3 both noted that they had engaged in some extra research or reading in some areas, while four of the 10 Trainees noted that they had to seek out knowledge or answers themselves. Trainee 7 commented that they had to go and find answers themselves rather than the tutor giving them to them, while Trainee 9 thought that taking photos for the assessment was good as *“it makes you go out and look for the evidence”*.

5.3.2 Deeper learning

A key finding of the study was that Trainees were better able to learn the theoretical knowledge aspects of the programme, using the new EP system. Having the theoretical knowledge learning better integrated with the related practical meant that Trainees not only found it easier to learn and understood its relevance, but they often gained a deeper understanding of the theoretical knowledge concepts they were learning. From the Trainees’ perspective, this deeper understanding was often evident in the improved confidence they had with having learned the theoretical knowledge concepts. Some of the Trainees felt that they had learned the theoretical knowledge concepts well enough to teach them to others, or to be able to easily transfer them to an unfamiliar situation of a different farm. For example Trainee 2 believed that the new EP assessment method helped them to *“understand the theory better”* and thought that they would easily be able to transfer that knowledge to another farm. Trainee 7 also felt that they knew the theoretical knowledge really well and was in fact helping to teach a new employee, about which they were quite comfortable. Numerous comments or instances were noted where Trainees believed they had learned things *“better”*, or found it easier to learn things. Trainee 3 found the monthly reports, that were part of the EP helped them to understand the whole farm better and that seeing animal health problems on farm really helped them to understand what the tutor had taught. Trainee 10 thought that doing a farm pasture walk on the farm they were working on and using that information in the theoretical knowledge assessment helped to *“learn it much better than just doing a written assessment”*.

Data from the Verifiers showed they also agreed that the new EP assessment method assisted Trainees to more easily learn the underpinning theoretical knowledge aspects of the programme, and to a deeper level. Verifier G used an example of the water supply assessment which highlighted that the EP system had helped their Trainee to understand the principles rather than to just learn information. This Verifier was very confident that their Trainee had a good understanding of these principles and could go to a different farm and work out how to use their water supply system. Verifier C felt that doing practical activities, such as farm pasture walks as part of the theoretical knowledge assessment helped their Trainee to make sense of the theoretical knowledge they were learning. Verifier F also thought that the mix of theoretical knowledge with practical in the new EPs helped their Trainee to have a better understanding and appreciate that there could be a range of responses to some of the theoretical knowledge concepts they had learned in class.

The Assessors agreed and believed the Trainees were gaining a better, or deeper understanding of the theoretical knowledge concepts than they had with the previous system. Assessor W believed that the Trainees had *“a better understanding of why”*. They thought that the new EP made Trainees *“think more deeply”* about what they were doing on farm. Assessor X felt that they were sure that Trainees were *“retaining more,”* while Assessor Z found that the Trainees were doing the assessments in more depth than previously and assumed they were getting more meaning from it.

5.3.3 Flexible learning

There was evidence in the data from the three groups of participants that learning opportunities afforded by the EP were more flexible than previously, which assisted the Trainees in their ability to learn. For the Verifiers, this flexible learning was evident in how the Trainees were able to use a range of on-farm information in the theoretical knowledge learning and assessment process, and learn the relevance of the theoretical knowledge concepts. The Assessors noted greater involvement of the Verifiers in the learning process than had been evident previously, and that this involvement added a different dimension to the Trainees’ learning. They found that the Verifiers were more likely to reinforce or add to the Trainees’ theoretical knowledge than under the previous system, and that this added a more practical perspective to the Trainees’ understanding of the theoretical knowledge. Assessor Z also noted that the Verifiers were more involved in the training than previously, while Assessor X thought that the Verifiers were more likely to have better discussions with their Trainees.

The Trainees had the most insight into this flexible learning aspect of the new EPs. Trainees thought that there were more opportunities for learning than in previous programmes. In particular, they felt the opportunities for collaborative or peer-to-peer learning were valuable aspects of the

programme. Having all the assessments in one place (the EP) and being able to retain it, allowed opportunities to reflect back on earlier learning, which was not possible with the previous assessment method. Trainees 5 and 7 outlined how they had enjoyed having discussions with classmates, learning what they were doing on their farms and comparing it to their own. These Trainees found that this opportunity to discuss ideas really helped to learn the topic and get extra ideas. Having all the theoretical knowledge assessment in one place was an improvement from Trainee 6's perspective as they found it was useful to go back over what had been done earlier in the course and look at it again. These Trainees all made the point that this "referring back" was not the case under the previous assessment system as all the theoretical knowledge assessments were retained by the Tutor.

5.4 More "real world" evidence is available to make assessment decisions

Assessment of the learning outcomes for these programmes consists of the Assessors (Training Advisers) making assessment decisions based on evidence from a range of sources. The main evidence utilised in this process are the theoretical knowledge assessment activities in the EP, and the performance of practical tasks in the workplace, which is documented in the EP and "signed off" by the Verifier (farmer). This "signing off" by the Trainee's Verifier is also accompanied by a discussion between the Trainee and the Verifier. A key finding from this study was that a greater range of "real world" or authentic evidence was available for the Verifiers and Assessors to use in making assessment decisions.

5.4.1 On-farm evidence

All three groups of participants found that the EP enabled the use of evidence that was specific to the farm the Trainee was working on in making theoretical knowledge assessment decisions. There was a consensus that this evidence improved the Assessors' ability to make good assessment decisions, and made the theoretical knowledge assessments more meaningful to Trainees than they had been previously. Assessor W commented that the assessment of theoretical knowledge was often based on workplace performance, and used an example of the milk quality assessment which utilised actual on-farm documentation the Trainee had completed as part of the assessment evidence. The example of the Trainees finding weeds specific to the farm they were working on and taking photos of these for assessment evidence was used by Assessor X to illustrate this point. Previously, Trainees just had to identify a range of weeds from photos or pictures supplied to them.

The Verifiers also noticed that evidence of on-farm performance helped inform the theoretical knowledge assessment. Verifier D thought there were some areas where the Trainees theoretical knowledge assessment was partially based on on-farm performance and gave the example of the diagnosis of metabolic diseases. This Verifier felt that the Trainees needed to experience this in a practical environment before being able to properly complete the relevant theoretical knowledge assessment. This Verifier also believed that under the previous assessment system *“the answers to the theory assessments were based on what the tutor expected,”* and thought that with the new EP there was room for a wider range of answers as it was based on the Trainee’s current farm experience. Examples of the animal health plan, the mating plan and the monthly reports were given by Verifier H as examples where the theoretical knowledge activities in the EP were highly relevant to the farm and where they found that their Trainee could apply this theoretical knowledge to on-farm situations.

The Trainees in general thought that being able to refer to, or use data from the farm they were working on was a key improvement in the assessment process. Trainee 8 felt that a big difference between the previous assessment method and the new EP was *“less right and wrong”*. This Trainee thought that with the previous assessment system, there was an answer the tutor wanted to hear, whereas in the new EPs the answer was about an individual farm so it was different for each person. Trainees 9 and 4 thought that the theoretical knowledge activities in the EP related well to on-farm practical and liked being able to utilise on-farm evidence for the theoretical knowledge assessments. An example of the weed identification and water supply assessments were given by Trainee 9 of where this had worked well.

5.4.2 More evidence

All of the groups of participants, particularly the Assessors and Verifiers, believed an advantage of the new EP was that more, and a wider range of, evidence was available to them for making assessment decisions. Both the Assessors and Verifiers particularly liked being able to utilise the evidence from the Trainees’ theoretical knowledge assessments as part of their assessment decision for the practical tasks, and to help make more holistic assessment decisions of the learning outcomes.

By having more evidence available, Verifiers felt more confident in making a decision. Verifier A found that the new EP gave them an opportunity to require more detailed evidence from the Trainee, while Verifier D found the theoretical knowledge assessments available in the EP useful as they could utilise these when going through the practical assessment process. Verifier E also noted that it was helpful having the theoretical knowledge visible in the EP when *“signing off”* on the

related practical tasks, and used an example of the pasture management activities for where this had worked well.

Assessors liked having more sources of evidence available to them to utilise in their assessment decisions. Assessor Z felt that the assessment discussions they had with Trainees and Verifiers were easier and worked much better because of the theoretical knowledge evidence in the EP. Assessor W found the EP easier to use as it required the Trainees to demonstrate more evidence, such as the photos, and believed that the new EP meant that the Trainees had to show things more than once, which they found beneficial for validation purposes. Assessors thought that it was less of a snapshot than the previous assessment method; it showed the Trainees' performance over time, and used a wider range of examples. Assessor Y also thought that having the Trainees' theoretical knowledge in the EP when having assessment conversations with Verifiers was really helpful and felt that the design of the EP meant that they were more likely to involve the tutor in the assessment process for the practical assessment, which helped them make better assessment decisions.

5.5 More active interaction between those involved in the assessment process

The assessment process for the practical activities in the EP utilises evidence of on-farm performance of the Trainees and theoretical knowledge aspects, as discussed in section 5.4. The Trainee's competence is confirmed by the Assessor, based on evidence in the EP and a professional conversation that the Assessor will have with the Trainee and the Verifier. Additionally, the assessment process relies on the Verifier and Trainee having also had a discussion about the Trainees' performance and on-farm evidence they can show of this performance. These discussions between all the parties involved are a critical part of the assessment process and all three groups of participants found that the new EP encouraged and enabled more interaction between participants than had the previous method of assessment.

5.5.1 Better assessment discussions between participants

The data showed that the new EP assessment method resulted in the participants in the assessment process having more discussions and interaction. This improved interaction resulted in more and/or better questions being asked to gather evidence. The initial part of the practical assessment discussion is between the Trainee and the Verifier. This discussion is generally done on an on-going basis, rather than as an event, and enables the Verifier to make a judgement about the Trainee's ability in practical, on-farm tasks (often referred to as the Verifier "signing off" on tasks). All three

groups of participants felt that the discussions, questions and interactions around this part of the assessment process were improved with the new EP assessment system.

The Trainees liked the increased dialogic interaction with the Verifier using the new EP. They thought that it was much better than the previous assessment system which was more *“get the work done and sign it off”* (Trainee 4). Trainee 6 noted that with the new EP assessment method, the Verifier had to be more involved in the process and felt that it was much better than the previous assessment method, where the Trainee would do the task and write down evidence of this in the work diary and then the Verifier would sign it off. This Trainee found that in the new EP there was much more questioning and discussion involved in the sign off process.

The Verifiers also believed the new EPs had improved the discussion and interaction between themselves and the Trainees. Verifier I found that the new EP prompted them to ask the Trainee more questions during the sign off process than under the previous assessment method. They commented that with the new EP they and the Trainee had to work through it together whereas with the previous assessment method the Trainee just brought it to the Verifier to sign off. Verifier E found having the theoretical knowledge assessments in the EP made it easier to ask questions and helped them have assessment conversations with the Trainee while Verifier G thought that the new EP gave more opportunity for Verifiers to comment on Trainees’ practical tasks. This Verifier felt previously there had not been much actual evidence that Trainees could do practical tasks.

The Assessors agreed that the new EP resulted in better discussion between Trainees and Verifiers. Assessor W felt that under the previous assessment system, Verifiers did not put much effort into the assessment process and were more likely to just *“tick the box”*. This Assessor felt that the new EPs encouraged Verifiers to give more examples of evidence and have better assessment conversations with the Trainees. Assessors X and Z also thought that the new EPs made the Verifiers more likely to have better assessment discussions with the Trainees and that the Verifiers were much more involved than in the previous assessment method.

The Assessors also found that the assessment discussions they were having with the Verifiers and the Trainees were better with the new EPs than with the previous assessment method. The Assessors found that having the theoretical knowledge evidence available in the EP was helpful in having their assessment discussions with the Verifier. Having this theoretical knowledge also meant that, if necessary, they could discuss with the Tutor before making a final assessment decision.

5.5.2 Confidence in a more valid assessment

A further finding from the study was that all the participant groups felt the new EP assessment method resulted in a more valid assessment. This belief was mostly due to there being more evidence, or more validation of evidence, used in the assessment process.

From an Assessor's perspective, this improvement in the evidence gave them more confidence in the assessment process and outcomes than they had in the previous assessment system. Assessor W believed the EP made it easier for the Assessor to make good assessment decisions as there was much more evidence required from the Trainee, including physical evidence such as photos. This Assessor felt there was more evidence of the Trainee's performance over time, and of things happening more than once which made for a more robust assessment. Assessor Y stated that they felt much more confident of making good assessment decisions with the new EPs, and felt assessment was more robust due to the triangulation of evidence from the Tutor, Trainee and Verifier. Assessor X thought that the new EP resulted in a better quality assessment due to the Assessor seeing all of the theoretical knowledge assessment evidence as well as having discussions with the Tutor and Verifier before making an assessment decision.

The data also showed evidence from the Trainees that they believed the new EP assessment method resulted in better quality assessment. Trainee 1 thought that the "*three-way triple check*" between the Assessor, Verifier and Tutor worked well and made sure assessment was sound. This Trainee thought that the amount of evidence that was required in the EP assisted in improving the quality of assessment. Trainee 3 also felt that the new EP was a better assessment method than previously, as they could cross-reference what was happening on farm with what the Tutor was saying, while Trainee 9 believed that the use of photos as evidence in the EP helped to make the assessment evidence more valid.

The Verifiers also thought that the new EP assessment method resulted in a more valid assessment. Verifiers A and D found that the new EP made it easier to have a three-way discussion between Verifier, Trainee and Assessor as there was more information available. This gave them more confidence in making a decision. Verifier G thought that the new EP assessment system was much better than the previous assessment system and that it had more evidence in it that the Trainees could do the practical tasks.

5.6 Preference for new assessment method

A consistent finding across all three groups of participants was that they preferred the new EP assessment method over the previous assessment method and believed it was an improvement. Some Trainees commented specifically that they were enjoying their training more than they had previously because of the new EP assessment method. The overall finding from all groups was that they were more satisfied with the new EP assessment method than with the previous assessment method. A range of reasons were given; many of which are encapsulated in sections 5.2 – 5.5 above as they relate to better learning and assessment. Other reasons are contained below in Table 5.

Seven of the nine Verifiers said that they found the new EP assessment method to be either better than the previous method, or that they preferred it to the previous method. Of the Trainees, nine out of 10 of them stated that they preferred the new EP assessment method, or liked it better than the previous assessment method. Three of the four Assessors stated that they preferred the new EP assessment method, or that they liked it better than the previous assessment method. The final Assessor felt that they needed more time using the EP to be definite about which method they preferred, but still believed that the new EP assessment method resulted in better assessment. As well as finding the new EP assessment method better themselves, some of the Assessors thought that the Verifiers and Trainees found it better, and some of the Verifiers felt that the Trainees found it better. Some of the key reasons the participants preferred the new EP assessment method are listed in Table 5 below.

Table 5: Reasons participants preferred the new assessment method		
Trainee	Assessor	Verifier
Am enjoying the current programme, particularly the discussions with others in the class and what is learnt from that. Much better than the previous assessment method (Trainee 5)	Definitely prefer the new EP assessment method. All information is in one place and it is easier to follow and understand. Felt that Trainees and Verifiers preferred the new assessment method also. (Assessor W)	Definitely prefer the new EP assessment method. Better information available to make assessment decisions, and get a better sense of what the Trainees understand (Verifier E)
Enjoying it much more than the previous programme, mostly because it is specific to the farm you are working on. Definitely prefer new EP assessment method (Trainee 7)	Definitely prefer the new EP assessment method over the previous one. Key reasons are better assessment of theoretical knowledge by integrating it with the practical, and much more involvement by the Verifier in the process. Felt that both Verifiers and Trainees definitely preferred the new EP assessment method also. (Assessor Z)	Much prefer the new EP assessment system. Verifier can see much more of what is going on and can get more involved in the training. Felt that under the previous system " <i>class was class and farm was farm and they were two separate things</i> ". (Verifier F)
Definitely prefer the new EP assessment method. Main reason is that you get a better understanding of what is happening on your farm (Trainee 8)		New EP assessment method was much better than the previous system. More visibility of where Trainee was at and better opportunities for Verifier to get involved. Felt that the Trainee preferred the new EP assessment system also. (Verifier G)

5.7 Practical challenges of change

One of the findings of the study, which was also consistent across the three groups of participants was that, while the introduction of the new EP assessment method was largely positive, and that the participants' preferred it to the previous assessment system, there were some aspects of it that were less satisfactory. The participants identified a range of issues or challenges. Some of these were not relevant to all three participant groups; however all of the participant groups did identify some challenges or areas of dislike with the new EP assessment method.

5.7.1 Difficulty using the new evidence portfolio

The data showed that all three participant groups took some time to get used to using the new EP and encountered some difficulties or challenges during this process. Verifier B found that it took a bit of time to understand how the EP worked as it was new. Verifiers C and F initially found the new EP confusing as to which parts the Verifier was meant to complete. Assessor W thought that the new EP was harder to follow as it was new and took time to understand. Assessor X noted that having all the theoretical knowledge in the EP made the assessment process more time consuming as they were still getting used to it. Potential plagiarism between Trainees was raised by Assessor Y who thought that this could be an issue with the new assessment method, as Trainees were now able to keep their EPs.

The Trainees also identified some challenges from their perspective. Trainee 2 thought that the wording of some of the questions in the EP was hard to understand. Examples from Trainee 6 were that having to take photos of things for evidence was annoying, and that there was some overlap between the regular part of the EP and the monthly reports so they had to record some evidence twice. Trainee 8 found the EP more confusing to find their way around, and Trainee 9 believed that some of the theoretical knowledge they were learning was too in-depth and not so applicable to their own farm situation.

5.7.2 Timing of marking of theoretical components of the evidence portfolio

Only Tutors were required to mark the theoretical knowledge assessments in the EP, however, this requirement created a dilemma for Trainees who required on-going access to the EP to record evidence of practical performance. Prompt turn-around of EPs was necessitated. Two of the four Assessors commented on this aspect of the EP causing some problems. Assessor W found that marking was harder as the Tutor could not take the EP away, although noted a potential solution was to take photos of the Trainees written work and email it to the Tutor. Assessor Y also found that marking had been a problem with Tutors needing to mark EPs, but Trainees needing to have them on the farm. Four of the 10 Trainees identified the marking of the EPs to be a problem. Trainees 1, 6, 7 and 8 all commented that the marking of the EPs caused some problems in that the Tutor sometimes needed to keep the EPs to mark, while the Trainees needed to use them on-farm to continue collecting evidence for the practical activities.

5.7.3 Timing of classroom and on-farm activities

The Trainees and the Verifiers felt that in some cases the timing of learning in class with the Tutor, did not match the timing of the related practical activity happening on the farm. Both the Trainees

and Verifiers felt that this disconnect made both the learning and assessment of these activities more difficult than they would normally have been.

Verifier I found that the new EP did not line up with the timing of seasonal on-farm tasks. It was discovered that this related to a timetabling error by the Tutor, which meant that the off-job training classes were not being run in the correct order that the timetable required.

5.8 Practical contextualisation of theoretical knowledge assessments

Trainees and Assessors commented on theoretical knowledge assessments in the new EP having a more practical context than under the previous assessment system, and being based on the farms the Trainees worked on. Under the previous system Trainees had evidence of practical on-farm performance recorded in a work diary. This practical was assessed in a similar manner to the new EP, with the involvement of the Verifiers and Assessors; however it was assessed in isolation from the theoretical knowledge assessments. The theoretical knowledge assessments were based on the classroom learning and were mostly written, short answer tests. While the theoretical knowledge topics underpinned the practical skills, there was very little, if any, connection made between them. Both these groups of participants thought the new EP was a significant improvement on the previous system.

All of the Assessors found that the new EP assessment method required a greater practical context for the theoretical knowledge assessments. Assessor W felt that there was definitely assessment of theoretical knowledge based on Trainees workplace performance. Assessor X believed that the new EP made the theoretical knowledge assessments and the practical relate, and noted that *“you can’t do one without the other now”*. Assessor Y thought that the theoretical knowledge assessment activities in the EP related really well to on-farm practical performance and that this on-farm performance helped to assess the Trainees’ theoretical knowledge. This Assessor felt that the theoretical knowledge assessment for the water supply topic was a good example of how information from on-farm performance was used in the theoretical knowledge assessment activities, and believed the employers really appreciated this approach. Assessor X commented that it was possible that some of the on-farm evidence used for the theoretical knowledge assessment, such as information from farm pasture walks, was not necessarily verified by the Trainee’s employer, and so could be made up.

From a Trainee’s perspective, they found that being able to use information from their on-farm performance for the theoretical knowledge assessment activities was positive. Trainee 7 felt that the

theoretical knowledge assessments in the new EP were less about a “right” answer than previously and were more about having relevant information from the farm they worked on. Trainee 8 also thought that the theoretical knowledge assessments in the EP were much better than the previous theoretical knowledge assessments as they were based on the farm where the Trainee worked. This Trainee noted that under the previous system the answers could be found in the resources but with the theoretical knowledge assessments in the new EP the Trainee had to go and find the answers or ask their employer where to find them. Trainee 10 found that they had to use information from the farm they worked on as part of the theoretical knowledge assessments in the EP which meant that they were able to apply the theoretical knowledge to their workplace. This use of on-farm information was illustrated by Trainee 10 using an example of the theoretical knowledge assessment for soils where the Trainee had to physically investigate the soils on the farm they worked on to complete this assessment activity. Trainee 4 felt that they were more able to put answers to the theoretical knowledge assessment activities in the EP because it was what was happening on farm. Both the Trainees and the Verifiers seemed to enjoy being able to apply the practical context of the farms they were working on to the theoretical knowledge assessments.

5.9 More understanding and clarity of what trainees are learning

One further finding from the study, which was shown in the data from the Verifiers, was that the new EP assessment method gave them greater visibility and understanding, of what the Trainees were learning during the classroom-based part of the programme. The Verifiers, who are the Trainees’ workplace supervisors or employers, invest a significant amount into the Trainees’ learning, in terms of time away from the job to attend class, time taken to assist with their learning and often financially, if the employer pays or assists with paying the Trainee’s course fees. The Verifiers commented that under the previous system, where the theoretical knowledge assessments were assessed and retained by the Tutors, the Verifiers seldom got to see the Trainees classroom-based learning or assessments. With the new EP assessment method, having all the theoretical knowledge assessment activities in together with the practical assessment activities, gave Verifiers good insight into what the Trainees were learning in class. Eight of the nine Verifiers commented favourably on this aspect of the new EPs. Verifier E thought the new EP was better than the previous system where the Verifier never got to see the theoretical knowledge learning and assessment. Verifier F felt that they could now see much more of what was going on and could be more involved in the training. Verifier H agreed that it was good to be able to see what the Trainee was doing, which was better than the previous system, while Verifier I noted that they now gained a much

better view of what the Trainee was learning in class, their progress and level of engagement.. *“It is good to know they are going to class and learning something”* (Verifier I).

5.10 Summary

The research data shows strong alignment across all participants that:

- The new EP assessment method has enabled better contextualisation of theoretical knowledge, and more integration of knowledge with practical, on-farm skills. Consequently Trainees have become more actively engaged with their learning and gained a deeper understanding of underpinning theoretical knowledge concepts.
- Evidence for assessment is more relevant and authentic, and there is more active engagement among those participating in the assessment process. This evidence has resulted in greater confidence among participants that the assessment is more robust.
- The new EP assessment method is preferred to the previous assessment method by all participant groups.

The data from the study also provides answers to the two research questions:

(A) *How does an integrated theory and practical assessment approach compare with traditional, separate written and practical assessment methods, from a learner’s, an employer’s and an assessor’s perspective?*

The data clearly shows that the new integrated assessment method utilised by the new EPs compares favourably with the traditional approach to assessment, from a Trainee’s, Employer’s and an Assessor’s perspective. All three of these groups preferred the new EP assessment method to the previous approach, and thought that the new method resulted in better learning outcomes for Trainees, as well as more robust and authentic assessment.

(B) *To what extent has this integrated assessment approach enabled learners to apply theoretical knowledge they have learned to practical workplace situations?*

The research data shows that all three groups of participants agree that the new integrated assessment approach, utilising the EP, has resulted in Trainees being able to apply theoretical knowledge to practical workplace skills, significantly more than under the previous system.

The findings show consistent alignment across all of the participants for six of the eight key categories that were identified from an analysis of the data, and indicate that all users of the new EP assessment method prefer it to the previous assessment method, and for similar reasons.

The discussion chapter will look at some key themes that have emerged from this study, and investigate how they relate to the literature. The discussion will identify where the findings from this research align with, or reinforce the literature; where it adds to the literature; and any areas where it is felt that further research may be beneficial.

Chapter 6: Discussion

6.1 Introduction

This study compared a traditional assessment model with a new holistic assessment model for vocational Trainees in the dairy farming industry in New Zealand. The traditional assessment model was unit standard based, which assessed theoretical knowledge and practical unit standards separately. The new holistic assessment model, using an evidence portfolio (EP), is designed to assess students' learning outcomes after completing the programmes. These learning outcomes include applied theoretical knowledge and practical skills. The learning outcomes are constructed as part of the programme development process and contribute towards the graduate outcomes of the qualifications, which are intended to recognise learners' cognitive, psychomotor and affective abilities.

The research findings showed agreement across the three groups of participants (Trainees, Assessors and Verifiers), about the new integrated assessment system enabling better contextualisation, integration, application and understanding of theoretical knowledge with on-farm practical skills. All three participant groups believed the new assessment method produced a more authentic and robust assessment and accordingly preferred the new assessment system in comparison to the previous system.

This discussion chapter will compare some key findings of the study to research literature. Specifically, it will look at the areas of: application of knowledge to the workplace, authenticity of assessment, portfolio assessment and the notion of competence.

6.2 Application of knowledge to the workplace

This research found that the new EP assessment method enabled Trainees to make strong connections between the theoretical knowledge learned in the classroom and the practical skills learned in the workplace. More opportunities to directly apply classroom knowledge to practical workplace skills not only improved the Trainees' performance of these practical skills but also resulted in a deeper understanding of the theoretical knowledge.

This finding reinforces the general principles of adult learning. Merrill (2002) proposed five principles of instruction which stated that learning is promoted when: (a) learners are engaged in solving real-world problems, (b) existing knowledge is activated as a foundation for new knowledge, (c) new knowledge is demonstrated to the learner, (d) new knowledge is applied by the learner, and (e) new knowledge is integrated into the learner's world. Evidence from this study shows that the EP enabled these effective pedagogies by requiring Trainees to: solve real world problems; have new knowledge demonstrated to them in practical ways; and apply and integrate this into their day-to-day farming lives. There were clear examples in the data of Trainees actively constructing their knowledge based on being able to apply it to workplace situations. Blending formal courses with workplace activities ensures learning is "focussed on developing learners' ability to solve the problems of their everyday professional job roles" (Collis & Margaryan, 2005, p. 726). This research demonstrated that Trainees appeared to learn better and gain a deeper understanding of the theoretical concepts by applying them to real-world, problem solving contexts.

Brinkerhoff (2006) discusses how the impact from training intervention is more likely to be successful when Trainees are suitable, ready for the training, and when they are able and supported to put their training into practice in the workplace. Similarly, Coetzer (2006) showed that learners needed an opportunity to use their skills and abilities, while workplace managers needed to take a role as a coach/facilitator. The findings of this research reinforce that literature. The study found that a key reason for the Trainees gaining a deeper understanding of the theoretical knowledge and being able to apply it, was that they were being supported in putting their learning into practice in the workplace. The study also showed that the introduction of the EP had allowed the workplace Verifiers to move from their previous role of "signing off" the Trainees' practical tasks, to a more active role in the theoretical and practical learning aspect of the programmes. This process resulted in the Verifiers assisting their Trainees to make sense of the theoretical knowledge in a workplace context.

This research also further reinforces Soden and Halliday's (2000) findings on the concept of "situated learning", where they found that expertise arises from knowledge being integrated and transformed through practice. Performance of real tasks allows the fusion of formal knowledge and the demands of practice (Soden & Halliday, 2000).

One of the findings to emerge from this research was that Trainees appreciated being able to have all their theoretical knowledge assessment information together in the EP, and being able to keep it. Trainees noted that it was advantageous to be able to look back over, or reflect on, what they had learnt when a related workplace situation arose. This aligns with Galbraith and Fouch's (2007) notion

of praxis (action with reflection) which allows learners to practice a new skill, while being able to analyse the quality of that practice. In a general sense, the findings of this study reinforce the literature on the application of knowledge to workplace practice. There are some key areas, as discussed above, where this is explicit.

As noted in the literature review in Chapter 2, there is minimal, if any, literature about assessment of workplace-based learners in a VET context such as exists in New Zealand. As also noted, in the conclusion of Chapter 2, a unique feature of VET in New Zealand is that Trainees are in full-time employment while they are enrolled in a training programme. This research adds to the literature in that Trainees' learning was enhanced when they were able to utilise real-world data, information or experiences from *their own workplace as part of the evidence for the assessment of their theoretical knowledge*. The data from the study shows that this was a key aspect of the improved, deeper learning of the Trainees and is an important finding in the context of the New Zealand VET system.

6.3 Authentic assessment

One of the key findings from this research was that there was more "real world" or authentic evidence available to make assessment decisions. The study also found that the new EPs encouraged and enabled more interaction and discussion within the triad of Trainee, Verifier and Assessor as part of the assessment process. Improved interaction between participants, coupled with an increase in on-farm evidence, led to the conclusion that the assessment of the learning outcomes of the programmes were more authentic and robust than had been the case under the previous assessment system. These findings about the authenticity of assessment utilising the new EP assessment method, align closely with the literature on authentic assessment. As noted in the literature review in section 2.5 there is a wealth of literature showing that authentic assessment tasks enables evidence of a student's competency in a real-world or simulated environment. More specifically, this research reinforces the notion of authentic assessment proposed by a range of authors. Gulikers et al (2004) discussed authentic assessment being "an assessment requiring students to use the same competencies or combinations of skills, knowledge and attitudes that they need to apply in the criterion situation in real life" (p. 69). DiMartino and Casteneda (2007) found that authentic assessment "requires students to use prior knowledge, recent learning, and relevant skills to solve realistic, complex problems" (p. 38). Finally, Hagner (2010) identifies "naturalistic assessment" as "the assessment of performance on real-world tasks and observation of responses in natural contexts" (p. 28) and as being synonymous with authentic assessment.

Gulikers et al. (2004) investigated authentic assessment in more depth, with their five dimensions of authentic assessment. The data from this research showed that assessment using the new EPs was authentic and robust, and shows a strong alignment with Gulikers et al's (2004) dimensions of authentic assessment. Refer to Table 6.

Table 6: Research findings compared to five dimensions of authentic assessment	
Five authentic assessment dimensions (Gulikers et al., 2004)	Current research findings
The assessment task – one that confronts students with activities that are also carried out in professional practice. They require students to integrate knowledge, skills and attitudes as professionals do.	Assessment of learning outcomes is based on performance of genuine workplace tasks, and underpinning theoretical knowledge needed for those tasks. Assessment is based on holistic, integrated evidence of Trainee's knowledge, skills and behaviour.
The physical context – the physical context of an authentic assessment task should reflect the way knowledge, skills and attitudes will be used in professional practice.	Assessment evidence is gathered from actual workplaces in which Trainees are employed.
The social context – authentic assessment should consider social processes that are present in real-life contexts. For example, collaboration.	Assessment is not contrived. It measures normal workplace behaviour and interactions such as questioning, collaboration, experimentation and problem-solving.
Assessment result or form – this relates to the quality, validity and fairness of the assessment	Quality, validity and fairness of the EP are determined by the evidence used, and the engagement, expertise and professionalism of those involved in making the assessment decision.
Criteria and standards – criteria are what the assessment is measuring (the outcome). Standards are the level of performance expected.	Assessment is based on well-defined unit standards that reflect the learning outcomes of the programme, and thus the graduate outcomes of the qualification.

For the above reasons, authentic assessment is valuable for learners. Gulikers et al. (2004) found that learners were stimulated to deeper learning when they perceived the assessment task to be authentic, while Timma (2007) found that authentic assessment practices influenced the way learners carried out their work. Learners “gained background knowledge and understanding about the reasons for work procedures being assessed” (p. 7). As workers, the learners valued “real life” assessment where they could demonstrate practical application of skills and knowledge through their actions and verbal responses to assessors.

The findings from this research align very closely with these literature findings. From the Trainees' perspective, and that of the Assessors and Verifiers, using real-world evidence resulted in the Trainees having a higher level of engagement and a deeper understanding of the theoretical knowledge they were learning. This authentic assessment method also influenced the Trainees' workplace performance and enabled them to demonstrate practical application of their skills and knowledge.

There is some dissension in the literature on the reliability and validity of authentic assessment. Hagner (2010) concludes that the validity and reliability of naturalistic assessments is less, as they cannot match the precision with which tests can be validated. Gulikers et al. (2004) disagree and propose that the validity of authentic assessments is one of the most important reasons for using them. These researchers discuss both 'construct validity' – which relates to whether an assessment measures what it is supposed to measure; and 'consequential validity' – which refers to the impact the assessment has on student learning. They conclude that "authentic competency-based assessments have higher construct validity for measuring competencies than so-called objective or traditional tests have" (p. 68). The findings of this research support the view that authentic assessments have a high level of both construct validity and consequential validity. There is strong evidence for construct validity in the data with the use of Trainees' actual workplace performance and associated evidence in a real employment situation. As far as consequential validity goes, there is also strong evidence that the new EP assessment method has a positive impact on Trainees' learning, as outlined in section 5.3.

This research contributes to the literature on authentic assessment in two ways. Firstly, by basing research around learners who are in full-time employment in a commercial workplace, the study gains an insight into genuinely authentic assessment where learners' skills, knowledge and behaviour are assessed against industry practice. Trainees are assessed in an environment which is *predominantly a workplace*, where training happens, as opposed to a training environment where work (simulated or real) happens. Secondly, this research has compared two assessment methods, both based in a real workplace context. Data were generated which show that an assessment methodology based around the use of real-world, authentic evidence, assessed in a holistic, integrated manner is deemed by the participants to be more authentic and valid than the previous assessment method.

6.4 Portfolio assessment

This research investigated the effectiveness of an evidence portfolio-based assessment method. The EPs used by the Trainees in their programmes were relatively structured, in that the Trainees were given clear guidelines as to what type of evidence they needed to collect. These guidelines are in comparison to more open portfolios where learners have more freedom to select the evidence to display in their portfolios. The literature suggests that the validity of portfolios as an assessment tool is weaker when learners have a large degree of freedom about its content (Michels et al., 2016; Dannefer et al., 2012). More structured portfolios, such as in the current study, are likely to have higher validity.

Findings from the current research confirmed much of the literature on EPs. In particular, the literature shows that portfolio-based assessment fosters self-reflection in learners and better enables the integration of theory and practice compared to traditional assessment methods (Buckley et al., 2010; Henderson et al., 2015; Jones, 2010; Van Tartwijk & Driessen, 2009). This research identified that the integration of theoretical knowledge and practice, and the application of that knowledge into the workplace was one of the major advantages of the new EP assessment method, in comparison to the previous assessment method which assessed theoretical knowledge in isolation from the workplace. The study also found that the Trainees' identified their ability to utilise the EP for further reference and self-reflection as being another key advantage of the new EP assessment method.

The literature also indicates that there are aspects of portfolios that promote learning in adults. Portfolios facilitate more individualised or personalised learning (Lai-Yeung, 2011) and more learner choice or flexibility (Askit, 2016), as well as authenticity of evidence (Shepherd & Hannafin, 2013; Van Tartwijk & Driessen, 2009.). This research reinforced this literature about portfolios promoting adults learning. It found that the EP resulted in more flexible and active engagement in learning, and that, while they were structured, within that structure the Trainees enjoyed being able to personalise or individualise their portfolios by utilising authentic evidence specific to their workplace situation.

The overall theme of the research literature is that evidence portfolios are an appropriate and authentic method of assessing competency in the workplace. As noted, most of the literature is based on professional occupations with minimal, if any, literature that examines the use of portfolios in a vocational context. This research reinforces the literature on the use of portfolios in adult learning contexts, both as an assessment tool, and to promote learning. It also makes a contribution to the literature by examining the use of EPs in a workplace-based, VET context.

6.5 The notion of competence

The literature review in Chapter 2 examined a wide range of opinions among authors and indeed between countries, of how to define competence. Table 1 outlines a range of approaches various countries take to competence. Historically at least, New Zealand has taken a different approach to competency, based on separate assessments of workplace performance and theoretical knowledge. This approach is evident in the example of the previous Primary ITO assessment process, used in this study as a comparison to the new EP assessment method. Under the previous assessment system, practical skills were assessed based on workplace performance, while theoretical knowledge was assessed separately, based on classroom learning. The more integrated, holistic approach to assessment of competence is preferred by the participants, and appears to result in improved learning. More authentic, valid assessment reinforces the recent work on the assessment of learning outcomes in the Finnish VET system by Räsänen and Rökköläinen (2014). These authors discuss how the Finnish system has moved to a context-based assessment of vocational skills in real work situations. They note that assessment in the past had been done by teachers; now teachers, students and workplace instructors jointly assess, focusing on the work processes and underpinning knowledge, as well as work methods, workplace tools, and key learning skills.

Due to the nature of the new post-TRoQ qualifications being designed around graduate outcomes, which are designed to assess the cognitive, psychomotor and affective domains of learners, Primary ITO took the opportunity to review assessment of competence. This re-think has resulted in an assessment method that, as the data from this research shows, is more effective at assessing Trainees in an integrated, holistic manner. With the introduction across the VET spectrum of the new, New Zealand qualifications, it is timely to re-visit the notion of competence in a New Zealand VET context. Competence should reflect not only the change in focus to a graduate outcome-based qualification system. Increasingly fast-paced technological changes in the workplace and learners' ability to cope with this change also needs to be recognised rather than just focussing on specific skills and knowledge acquisition. A notion of competence that considers a more holistic, rounded view of a learner's skills, knowledge and behaviour, in a work related context would seem to be more appropriate. Evidence, both from the literature and from this research, indicates that a model of competence that might be of more value in modern VET in New Zealand would consist of four key attributes:

1. *Technical* The skills and knowledge related to workplace tasks.
2. *Application* The ability to apply these skills and/or knowledge to different contexts, using analytical, critical thinking, or problem-solving skills.
3. *Personal* Behavioural aspects of the learner such as attitudes, motivation, self-reflection, self- correction, self-organisation, ability to learn.
4. *Social* Communication and social interaction.

It is hoped that one outcome of this research will be to initiate further discussion and research about what competence is, and how it may be applied differently for the future.

6.6 Summary of discussion

The findings of this research resulted in consistent data across three different participant groups. These findings have reinforced the literature in a number of areas. This research aligned with much of the literature around the application of knowledge to the workplace, reaffirming some key principles of adult learning and literature about deeper learning of Trainees, due to a greater alignment of theoretical knowledge with workplace practice. The findings from this research also aligned with much of the literature on authentic assessment. It was able to confirm current thinking about what authentic assessment is, and its value to learners.

This research has also made some original contributions. It has added to the literature in the area of Trainee use of real-world data, information and performance from their own workplaces as part of the assessment of theoretical knowledge. This research also contributed to an area where the literature is contradictory, by adding further evidence to the assertion that authentic assessment has more validity than traditional tests. Contributions to the literature are also made in the area of authentic assessment, by producing findings based on learners who are in full-time employment in a commercial workplace while enrolled in a training programme, and by making a specific comparison between two different assessment methods in this context.

This research has reinforced some recent thinking about what competence means and how it is assessed, from the Finnish VET system, and based on the findings from the study, and the literature, proposes a change in the way competence is viewed in the New Zealand VET sector in the future, by combining learners technical, application, personal and social dimensions in a more overarching view of competence.

Chapter 7: Conclusions

7.1 Introduction

This research was undertaken due to the changes in the New Zealand VET qualifications that emerged from the TRoQ initiated by NZQA. These new qualifications took a more holistic approach to learner achievement, based on graduate outcomes that measured learners' integrated skills, knowledge and attributes. Due to their structural change, Primary ITO introduced a significantly different approach to assessment of the programmes learning outcomes when programmes towards these qualifications were introduced in the dairy farming sector in early 2016. One of the key reasons for undertaking this research was to determine how well the new EPs had worked as an assessment method, as well as what implications this might have for the introduction of programmes towards the new qualifications across the wider primary sector in the coming years.

The sample groups for this research were drawn from dairy farming Trainees who were enrolled in the new qualifications, and had also achieved one of the previous qualifications. The Employers and Assessors of these Trainees were also included. A qualitative, case study research approach was employed which utilised semi-structured interviews with the participants to gain their views on the new assessment methodology and how it compared to the previous one.

7.2 Research questions

This study set out to answer two research questions:

(A) How does an integrated theory and practical assessment approach compare with traditional, separate written and practical assessment methods, from a learner's, an employer's and an assessor's perspective?

(B) To what extent has this integrated assessment approach enabled learners to apply theoretical knowledge they have learned to practical workplace situations?

The study has generated sufficient data to answer both questions unequivocally.

For Question A clear evidence is provided from all the participant groups that the new EP assessment method compares favourably with the previous assessment method. All of the

participant groups stated that they preferred the new assessment method over the previous one. Trainees were more motivated and engaged in their learning, they had gained a deeper understanding of the theoretical knowledge concepts, and the new assessment method was perceived to be more authentic and valid by all three participant groups.

There was also clear evidence from the data to answer research Question B. This evidence showed that the new EP assessment method enabled learners to apply theoretical knowledge to practical workplace skills significantly more than under the previous assessment system.

7.3 Key outcomes

Along with providing answers to the research questions, the study generated three other key outcomes.

Firstly, it reinforced much of the literature on adult learning, VET, competence-based learning and assessment, and authentic assessment. It also made some original contributions to the literature, by conducting this research on workplace-based learners, in a post-TRoQ New Zealand VET setting.

Secondly, the study identified that the new EP assessment method enabled; (i) Trainees to become more engaged with their learning; (ii) better integration of theory and practical learning, and (iii) involvement of Employers (Verifiers) and Assessors in the learning process, more than the previous assessment method had. This integration resulted in Trainees gaining a deeper understanding of the underpinning theoretical knowledge, and being better able to apply their understanding to practical workplace situations.

Thirdly, the research found that due to the ability to include “real world”, on-farm evidence, into the theoretical knowledge assessments, and by facilitating more interaction and discussion between the Trainees, Verifiers and Assessors than had previously been the case, the new EP assessment method resulted in more robust and authentic assessment.

7.4 Implications of this research

The new EP assessment method resulted in Trainees having a deeper understanding of theoretical knowledge principles that underpin practical performance. Moreover, Trainees have a greater ability to apply these theoretical principles to actual workplace situations, and transfer this theoretical knowledge to other, less familiar settings.

One of the key aspects of adult learning, and especially vocational-based learning, is that knowledge is constructed, rather than acquired, and that this knowledge is constructed in a work-based context that is relevant and applicable to learners' daily lives. In essence, in VET, the purpose of learning theoretical knowledge is generally to underpin practical workplace tasks. It is logical, therefore, to propose that, if a practical workplace task, or demonstration of a practical workplace skill, cannot be adequately performed or demonstrated unless a learner has the relevant underpinning knowledge, then the competent performance of that task, or demonstration of the skill should be a valid measure of the learners' related theoretical knowledge.

Further use of this assessment method would enhance the link between theoretical knowledge and practical skills. It would also have the advantage of removing some of the burden of written assessment from Trainees, ensure learning was more focussed on the specific theoretical knowledge required to underpin the practical skill, and prevent much of the over-assessment that currently happens when theoretical knowledge and practical performance are assessed separately.

There is some evidence from this research to suggest that a measure of a Trainee's workplace performance would give valid evidence of their underpinning theoretical knowledge. For example, a number of Trainees commented that they had used evidence of work they had performed on the farm for the related theoretical knowledge assessments. There were other examples, from Verifiers and Assessors also, where they found that performance of on-farm of skills, such as mastitis treatment, or use of water supply systems demonstrated the Trainees' theoretical knowledge in a practical context.

Based on a study of the literature, and data from this research, it is likely that in many cases a Trainee's performance of a practical workplace task would provide sufficient evidence to make a valid judgement of their theoretical knowledge. However, it is recommended that further research is done in this area to increase the generalizability of the findings.

7.5 Future research

The findings of this research are specific to dairy farming trainees in the New Zealand VET sector. It is likely that the underlying concepts of application of theoretical knowledge to the workplace, deeper understanding of theoretical knowledge, increased learner engagement and authentic, robust assessment that this research discovered would be applicable across a wider range of programmes in the Primary sector, and indeed across the broad VET spectrum in New Zealand. However, this research was conducted in a particular context and there is no certainty that these results would be

generalizable outside this context. Further research in other sectors is needed to confirm that the findings of this study are applicable to a wider context.

7.6 Recommendations

The findings from this research also identified some practical challenges associated with a change to the new EP assessment system. The most significant of these challenges were firstly, that the participants took some time to get used to the new EP and the considerable difference from the previous assessment method. Secondly, the timing of the Tutors' marking the EP caused some difficulty, as the Trainees needed to retain the EP to enable them to continue to record their on-job assessment evidence.

These challenges have resulted in three recommendations to the Primary ITO programme developers to consider for future assessment development:

1. Consider a more extensive training programme for Assessors when new assessment methods are introduced. These changes will enable Assessors to become more familiar with the assessment documents prior to implementation of the programmes. It will also enable them to assist the Trainees and Verifiers with familiarisation of the EPs to reduce the confusion that arises from introducing new methods of assessment.
2. If Primary ITO continue to utilise paper-based EPs, ensure alignment between the Tutors and the Programme Developers as to when the most appropriate times are throughout the programme for the Trainees to hand in their EPs for marking. This would minimise the disruption to Trainees' on-going practical evidence collection. These periods should be noted in the course timetable so the Trainees understand the expectations of when they need to complete the theoretical knowledge assessments for marking, and exactly when, and for how long, they will be without the EPs.
3. Primary ITO could also consider introducing an electronic, cloud-based EP. This would enable all the participants in the assessment process – Trainees, Verifiers, Assessors and Tutors to access the EP simultaneously and would remove the need for the tutors to retain the EP for marking.

7.7 Value of the research

New Zealand is currently at a crossroads in the VET sector. The introduction of the new, post TRoQ qualifications is the most significant change in this sector of the education system since the introduction of the unit standard based system in the early 1990's. These new qualifications have the potential to create quite radical change to VET in New Zealand for the foreseeable future. In a more focussed sense, they are likely to encourage a re-think of how training is delivered and particularly how any workplace-based component of that training contributes to the overall picture. These new qualifications are also likely to change the way competence is viewed in the context of VET in New Zealand and are likely to enable educators and industry leaders to move towards a more holistic, integrated, capability-based view of competence. In a wider sense, the manner in which these new qualifications encourage this change in training delivery and assessment has the potential to greatly enhance New Zealand's workforce capability and productivity by producing graduates whose capabilities are much more aligned with the current and future needs of industry.

This research has contributed to the future of VET in New Zealand, by comparing a new assessment system with the previous one, and identifying a number of areas where there was significant improvement to Trainees' learning and assessment outcomes using the new assessment system. The research has also proposed some different thinking about what competence means in the context of New Zealand VET and how this could be applied. Finally, this research has hypothesised that Trainees' theoretical knowledge may be able to be validly assessed based on evidence from their practical workplace performance.

It is hoped that more research in this area will be done in order to validate the positive change that this study found, and further investigate the proposals from this research around what competence means, and knowledge assessment based on workplace performance.

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National Certificate in Agriculture (Animal Feeding and Pastures) (Level 3)

Level 3

Credits 53

This qualification has been **reviewed**. The last date to meet the requirements is 31 December 2017.

Transition Arrangements

Version 3 has been reviewed and replaced by the New Zealand Certificate in Agriculture (Pastoral Livestock Production) (Level 3) [Ref: 2217]. People currently working towards this replaced qualification may either complete the requirements by December 2017 or transfer their results to the replacement qualification.

Version 3 of this qualification has been republished to extend the last date of enrolment from 31 December 2015 to 31 December 2016, also to extend the last date for assessment from 31 December 2016 to 31 December 2017.

After 31 December 2016 all new trainees will be enrolled in programmes leading to the replacement qualification.

For detailed information see [Review Summaries](#) on the NZQA website.

NZQF National Qualification Registration Information

Process	Version	Date	Last Date for Assessment
Registration	1	September 2008	December 2012
Revision	2	May 2011	December 2016
Republished	2	October 2013	December 2016
Review	3	November 2013	December 2016
Republication	3	June 2015	December 2017

Standard Setting Body

Primary Industry Training Organisation
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National Certificate in Agriculture (Animal Feeding and Pastures) (Level 3)

Level	3
Credits	53

Purpose

This qualification is for people with some experience in the cattle, dairy, deer or sheep farming sectors of the agriculture industry. On completion of this qualification people will be able to work under little or no supervision.

This qualification recognises the specialised and seasonal nature of modern cattle, dairy, deer and sheep farming. People will be able to gain the skills and knowledge to specialise in animal feeding and pastures management.

The compulsory section includes the skills related to livestock grazing management and feeding; and weather interpretation. This section also includes knowledge of pasture production, feed budgeting and management of feed surpluses and deficits; pasture supply and demand and grazing systems; and the impact of agriculture on soils.

The elective section recognises the variations amongst farms in the use of agricultural vehicles such as tractors, motorcycles, All Terrain Vehicle Utilities (ATVUs), and quad bikes; as well as injury factors and how to manage these. It also has a variety of standards related to a range of farm skills, the set-up, operation, and maintenance of irrigation systems, knowledge of fertilisers, and factors that contribute to injury on farms. This section allows people to select standards relevant to their own farming situation.

This qualification includes optional standards covering a range of additional skills. Whilst these standards are not required to achieve the qualification, they may be considered useful for obtaining underpinning skills or knowledge reflecting on-farm variations such as irrigation, weed control, electric fencing, and livestock.

This qualification builds on the knowledge and skills in the National Certificate in Agriculture (Level 2) with strands in Cattle Farming, Dairy Farming, Deer Farming, and Sheep Farming [Ref: 1434].

For people involved with dairy farming, this qualification also has a link with the following qualifications as an overall package of seasonal farm skills:

- National Certificate in Agriculture (Cattle Breeding) (Level 3) with strands in Beef Cattle Farming, and Dairy Cattle Farming [Ref: 1436];
- National Certificate in Dairy Farming (Milking) (Level 3) [Ref: 1440];
- National Certificate in Dairy Farming (Animal Health and Husbandry) (Level 3) [Ref: 1441].

These qualifications may be completed concurrently or individually as seasonal activities occur on the dairy farm, and depending on the degree of specialisation of the dairy farm.

For people involved with cattle or sheep farming, this qualification has a link with the following qualifications as an overall package of seasonal farm skills:

- National Certificate in Agriculture (Cattle Breeding) (Level 3) with strands in Beef Cattle Farming, and Dairy Cattle Farming [Ref: 1436];
- National Certificate in Agriculture (Stockmanship) (Level 3) [Ref:1437];
- National Certificate in Agriculture (Animal Health and Husbandry) (Level 3) with strands in Cattle Farming, and Sheep Farming [Ref: 1438];
- National Certificate in Sheep Farming (Sheep Breeding) (Level 3) [Ref: 1443].

These qualifications may be completed concurrently or individually as a large proportion of farms run both cattle and sheep, and each of the qualifications are associated with seasonal activities on the farm.

For people involved with deer farming, this qualification has a link with the National Certificate in Deer Farming (Level 3) [Ref: 1442] as an overall package of seasonal farm skills. These two qualifications may be completed concurrently or individually as seasonal activities occur on the deer farm, and depending on the degree of specialisation of the deer farm.

On completion of this qualification people can progress to one or more of the Level 4 agriculture qualifications.

Replacement Information

This qualification, and the following qualifications, replaced the National Certificate in Agriculture (Level 3) with strands in Arable Farming, Cattle Farming, Dairy Farming, Deer Farming, and Sheep Farming [Ref: 0985]:

- National Certificate in Agriculture (Cattle Breeding) (Level 3) with strands in Beef Cattle Farming, and Dairy Cattle Farming [Ref: 1436];
- National Certificate in Agriculture (Stockmanship) (Level 3) [Ref: 1437];
- National Certificate in Agriculture (Animal Health and Husbandry) (Level 3) with strands in Cattle Farming, and Sheep Farming [Ref: 1438];
- National Certificate in Arable Farming (Level 3) [Ref: 1439];
- National Certificate in Dairy Farming (Milking) (Level 3) [Ref: 1440];
- National Certificate in Dairy Farming (Animal Health and Husbandry) (Level 3) [Ref: 1441];
- National Certificate in Deer Farming (Level 3) [Ref: 1442];
- National Certificate in Sheep Farming (Sheep Breeding) (Level 3) [Ref: 1443].

Credit Range

	Compulsory	Elective	Optional Standards
Level 2 credits	13	-	16
Level 3 credits	23	17	-
Total	36	17	16
Total for Qualification	53		

Requirements for Award of Qualification

Award of NZQF National Qualifications

Credit gained for a standard may be used only once to meet the requirements of this qualification.

Unit standards and achievement standards that are equivalent in outcome are mutually exclusive for the purpose of award. The table of mutually exclusive standards is provided on the New Zealand Qualifications Authority (NZQA) website: <http://www.nzqa.govt.nz/qualifications-standards/standards/standards-exclusion-list/>.

Reviewed standards that continue to recognise the same overall outcome are registered as new versions and retain their identification number (ID). Any version of a standard with the same ID may be used to meet qualification requirements that list the ID and/or that specify the past or current classification of the standard.

Summary of Requirements

- Compulsory standards
- Elective – A minimum of 17 credits as specified

Detailed Requirements

Compulsory

The following standards are required

Agriculture, Forestry and Fisheries > Agriculture > Farming Skills

ID	Title	Level	Credit
16	Describe pasture plants and production, and ways to optimise pasture growth and utilisation	3	5
19081	Describe annual feed supply and demand, methods to manage feed surpluses and deficits, and perform calculations	2	2
24628	Describe pasture supply and demand, feeds, and grazing systems	3	7
24631	Assist with livestock grazing management, and feed livestock	3	6

Agriculture, Forestry and Fisheries > Agriculture > General Agriculture

ID	Title	Level	Credit
19138	Monitor and interpret weather information	2	4
24542	Demonstrate knowledge of the impact of an agriculture system on soils	2	3
24543	Demonstrate knowledge of the formation, and factors which influence properties, of soils on-farm	3	5

Agriculture, Forestry and Fisheries > Pest Management > Pest Control

ID	Title	Level	Credit
21555	Demonstrate knowledge of weeds and their control	2	4

Elective

A minimum of 17 credits at Level 3

Agriculture, Forestry and Fisheries > Agriculture > Agricultural Vehicles and Machinery

ID	Title	Level	Credit
19048	Apply fertilisers using tractor or All Terrain Vehicle (ATV) with mounted or trailed equipment	3	6
19054	Ride a motorcycle on undulating terrain	3	4
19055	Ride a motorcycle with mounted equipment on flat terrain	3	2
24558	Drive an All Terrain Vehicle Utility (ATVU) on undulating terrain	3	5
24559	Ride an All Terrain Vehicle (ATV) on undulating terrain	3	6
24560	Drive an All Terrain Vehicle Utility (ATVU) with trailed equipment	3	3
24561	Ride an All Terrain Vehicle (ATV) with trailed equipment	3	2
24562	Drive an All Terrain Vehicle Utility (ATVU) with mounted equipment or a load	3	3
24563	Ride an All Terrain Vehicle (ATV) with mounted equipment or a load	3	4

Agriculture, Forestry and Fisheries > Agriculture > Deer Farming

ID	Title	Level	Credit
8624	Carry out deer grazing management, and feed deer as directed	3	3

Agriculture, Forestry and Fisheries > Agriculture > Farming Skills

ID	Title	Level	Credit
574	Prepare and harvest hay or silage	3	5
582	Handle livestock when moving and drafting and when livestock are distressed	3	6
19115	Handle and move livestock	3	6
19119	Set up, operate, and maintain a travelling irrigation system	3	4

Agriculture, Forestry and Fisheries > Agriculture > General Agriculture

ID	Title	Level	Credit
19142	Describe the role of elements and fertilisers in primary production, and soil testing	3	6
23542	Identify factors, and describe how to manage factors, that contribute to injury in a rural workplace	3	4

Optional standards

The following standards are optional

Agriculture, Forestry and Fisheries > Agriculture > Farming Skills

ID	Title	Level	Credit
19112	Check and report on livestock	2	4
19120	Set up, monitor, and maintain a borderdyke irrigation system	2	3
19122	Set up, operate, and maintain a non-travelling spray irrigation system	2	3
24629	Feed livestock with supplementary feed as directed	2	2

Agriculture, Forestry and Fisheries > Agriculture > Fencing

ID	Title	Level	Credit
561	Install, dismantle, and store temporary electric fences	2	2

Agriculture, Forestry and Fisheries > Primary Sector > Plant Pest, Weed, and Disease Control

ID	Title	Level	Credit
21556	Control weeds under supervision	2	2

Transition Arrangements

Version 2

Version 2 was republished in order to include reverse transition arrangements (see section below) to ensure candidates would not be disadvantaged when expiring standards were no longer available.

Version 2 was issued following a revision.

Changes to structure and content

- The overall credit value of the qualification has reduced from 56 to 53 credits, however essential skills that the learners obtain remains the same.

- Standard 23542 was removed from the compulsory section and included in the elective section to allow for on-farm variances.
- Standard 19142 was added to the elective section to allow for on-farm variances.
- The elective rule has changed from a minimum of 15 credits as specified to a minimum of 17 credits as specified.
- Optional standards elective has been added to the qualification for obtaining underpinning skills or knowledge that may be required to reflect on-farm variations.

For detailed information see [Review Summaries](#) on the NZQA website.

This qualification contains standards that replace earlier standards. For the purposes of this qualification, people who have gained credit for the expiring standards are exempt from the requirement to gain credit for the replacement standards – see table below.

Credit for	Exempt from
14490, 14491	23542
19058	24558, 24559
19059	24560, 24561
19060	24562, 24563
19102	24628

People currently working towards version 1 of this qualification may either complete the requirements of that version or transfer their results to version 2. However, it is recommended that persons transfer their results from version 1 to version 2.

All new learners will be enrolled in programmes or courses leading to the award of version 2.

It is not intended that anyone be disadvantaged by this revision. However, anyone who feels they have been disadvantaged may appeal to the Primary Industry Training Organisation at the address below.

Reverse transition

Reverse transition has been included for version 2 of this qualification to allow candidates to complete the qualification using the expiring standard or replacement standard.

Version 2 of this qualification contains a standard that has been replaced and will expire on 31 December 2013. For the purposes of this qualification, people who have gained credit for the replacement standard are exempt from the requirement to gain credit for the expiring standard – see table below.

Credit for	Exempt from
27210	21555

Previous version of the qualification

Version 1 of this qualification, and the following qualifications, replaced the National Certificate in Agriculture (Level 3) with strands in Arable Farming, Cattle Farming, Dairy Farming, Deer Farming, and Sheep Farming [Ref: 0985]:

- National Certificate in Agriculture (Cattle Breeding) (Level 3) with strands in Beef Cattle Farming, and Dairy Cattle Farming [Ref: 1436];
- National Certificate in Agriculture (Stockmanship) (Level 3) [Ref: 1437];
- National Certificate in Agriculture (Animal Health and Husbandry) (Level 3) with strands in Cattle Farming, and Sheep Farming [Ref: 1438];
- National Certificate in Arable Farming (Level 3) [Ref: 1439];
- National Certificate in Dairy Farming (Milking) (Level 3) [Ref: 1440];
- National Certificate in Dairy Farming (Animal Health and Husbandry) (Level 3) [Ref: 1441];
- National Certificate in Deer Farming (Level 3) [Ref: 1442];
- National Certificate in Sheep Farming (Sheep Breeding) (Level 3) [Ref: 1443].

The last date for assessments to take place for the replaced qualification is December 2012.

Certification

This certificate will display the logos of NZQA, the Primary Industry Training Organisation and the organisation that has been granted consent to assess against standards that meet the requirements of the qualification (accredited).

Classification

This qualification is classified according to the classification system listed on the Directory of Assessment Standards (DAS) and the New Zealand Standard Classification of Education (NZSCED) system as specified below.

DAS Classification		NZSCED	
Code	Description	Code	Description
93	Agriculture, Forestry and Fisheries > Agriculture	050199	Agriculture, Environmental and Related Studies > Agriculture > Agriculture not elsewhere classified

Quality Management Systems

Providers and Industry Training Organisations must be granted consent to assess by a recognised Quality Assurance Body before they can register credits from assessment against standards. Organisation with consent to assess and Industry Training Organisations assessing against standards must engage with the moderation system that applies to those standards. Consent to assess requirements and the moderation system are outlined in the associated Consent and Moderation Requirements (CMR) for each standard.

Appendix B – NZ Certificate in Agriculture (Pastoral Livestock Production) (Level 3)

Qualification details

Title	New Zealand Certificate in Agriculture (Pastoral Livestock Production) (Level 3)		
Version	1	Qualification type	Certificate
Level	3	Credits	40
NZSCED	050105	Agriculture, Environmental and Related Studies > Agriculture > Animal Husbandry	
Qualification developer	Primary ITO		
Next review	December 2017		
Approval date	November 2013		
Strategic purpose statement	<p>The purpose of this qualification is to provide the pastoral farming sector with individuals who have the skills and knowledge to assist in managing the factors which influence the quantity and quality of pastoral livestock production.</p> <p>Learners will benefit by having a qualification within a training pathway that recognises progression through the industry, as well as increased skills and knowledge acquisition to enable improved job performance.</p> <p>The pastoral livestock industry will benefit by having people who can apply knowledge of pastoral livestock production to the practical application of production plans and have gained the foundation knowledge to pathway into production management roles.</p> <p>This qualification is targeted at people with some experience in the pastoral farming sector who want to develop their skills and knowledge in the operation of pastoral farming production systems.</p> <p>Graduates will be capable of working under limited supervision.</p>		
Outcome Statement	Graduate profile	<p>Graduates of the qualification will be able:</p> <ul style="list-style-type: none"> – assist with the management of feed supply and demand to meet livestock production targets. 	
	Education pathway	<p>This qualification may build on the National Certificate of Educational Achievement (Level 2) with Primary Industries Vocational Pathway endorsement and may lead on to the New Zealand Certificate in Agriculture (Level 4) with strands in Arable Farming, Dairy Farming, and Livestock Farming [Ref: 2212].</p>	
	Employment pathway	<p>Graduates of this qualification are likely to be employed at a junior level within the livestock sector as farm assistants or shepherds. They may be employed full-time in a production role</p>	

		or perform the work as part of a wider on-farm role.
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Qualification specifications

<p>Qualification award</p>	<p>This qualification may be awarded by the Primary ITO as the qualification developer and the industry training organisation arranging training leading to the qualification under section 5 of the Industry Training Act 1992.</p> <p>This qualification may also be awarded by an education organisation accredited under section 250 of the Education Act 1989 to deliver an approved programme leading to this qualification.</p> <p>The formal document certifying the award of this qualification will display the NZQF logo and may also include the name and/or logo of the awarding education organisation.</p>
<p>Evidence requirements for managing consistency</p>	<p>All education organisations offering programmes leading to the qualification must engage with arrangements for managing consistency, including covering actual and reasonable related costs.</p> <p>Each education organisation is responsible for deciding what specific evidence it will provide to demonstrate how well its graduates meet the graduate profile outcomes of the qualification.</p> <p>Evidence of the following must be provided:</p> <ul style="list-style-type: none"> • Student feedback on course delivery and qualification achievement, their perception of the value of the training, and suggestions for improvements • Feedback from employers on the level of skills, knowledge and behaviour demonstrated by graduates of the qualification • Evidence of effective internal quality assurance systems • Portfolios of work and/or assessment samples demonstrating the range of student performance within a programme <p>TEOs can also provide any other relevant evidence that supports the consistency review.</p>
<p>Credit transfer and recognition of prior learning arrangements</p>	<p>Education organisations must have policies and procedures in place for managing credit transfer, and assessing recognition of prior learning and recognition of current competency. These policies and procedures, and information about associated fees, must be available to the candidate prior to enrolment.</p> <p>To facilitate credit transfer, education organisations must clearly demonstrate the equivalency or comparability between each of the outcomes in the graduate profile, and the assessment components of their programmes.</p>
<p>Minimum standard of achievement and standards for grade</p>	<p>The minimum standard of achievement required for award of the qualification will be the achievement of all graduate</p>

endorsements	outcomes in the graduate profile through successful completion of an NZQA approved programme.
Entry requirements (including prerequisites to meet regulatory body or legislative requirements)	There are no mandatory prerequisites to meet regulatory body, or legislative requirements for this qualification.

Qualification conditions

Overarching conditions relating to the qualification

Conditions for programme structure	None.
Conditions for programme context	Competency for this qualification will typically be demonstrated in a workplace environment.
Other conditions	<p>All outcomes in this qualification require aspects of record keeping and communication, which should be considered as part of the assessment process.</p> <p>Compliance with workplace health and safety requirements, sustainable practices and animal welfare standards applies across all outcomes.</p>

Specific conditions relating to the Graduate profile

Qualification outcomes		Indicative Credits	Conditions	Mandatory or Optional
1	Assist with the management of feed supply and demand to meet livestock production targets	40	<p>Programmes should include the following topics:</p> <ul style="list-style-type: none"> – Soils and fertilizer application – Pasture supply and demand – Irrigation and/or drainage – Weed and pest control – Feed value – Pasture quality – Supplementary feeds – Nutritional requirements of livestock – Water supply and quality – Animal production targets (e.g. milk, meat, wool, velvet) – Weather – Fertilisers and agrichemicals – Grazing methods – Pasture establishment/renovation 	Optional

			– Pasture conservation.	
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Transition information

Replacement information	This qualification replaced the National Certificate in Agriculture (Animal Feeding and Pastures) (Level 3) [Ref: 1435].
<p>Trainees currently enrolled in programmes leading to the replaced qualification may either complete the requirements by 31 December 2017 or transfer their results to this replacement qualification.</p> <p>The last date for entry into programmes leading to the replaced qualification is 31 December 2016. The last date for assessment of the replaced qualification is 31 December 2017 at which time the qualification will be designated as discontinued.</p> <p>It is the intention of Primary ITO that no existing trainee should be disadvantaged by these transition arrangements. Any person who considers they have been disadvantaged may appeal to the Primary ITO.</p>	

Republication information

<p>Version 1 of this qualification was republished In February 2015 to update the Evidence requirements for managing consistency.</p> <p>Version 1 of this qualification was republished in June 2015 to extend the last date of enrolment of the replaced qualification from 31 December 2015 to 31 December 2016, also to extend the last date for assessment from 31 December 2016 to 31 December 2017.</p>
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Appendix C – Example from Primary ITO Work Diary

Implement the mating plan with guidance and discussion with the boss.

You can:	Date (✓ for competency)	
<ul style="list-style-type: none"> • Discuss the farm mating programme with your boss. For example: <ul style="list-style-type: none"> ◦ Pre-mating heats, number of weeks. ◦ How are non-cyclers dealt with (for example, intervention, natural mating etc). ◦ Animal health programme for mating (for example, minerals, metrichecking etc). ◦ Interventions used (for example, CIDRs, prostaglandin etc). ◦ Planned start of mating – is this different for the heifers compared to the cows? ◦ Are the heifers AI'd or naturally mated? ◦ Number of weeks AI ◦ Are bulls nominated for AI? ◦ Breed and type of semen selected. ◦ Any selection of cows to specific bulls made. ◦ Number of weeks natural mating (number and breed of bulls required). ◦ Date of first pregnancy test. 		
<ul style="list-style-type: none"> • Discuss the targets for mating. For example: <ul style="list-style-type: none"> ◦ Submission rates ◦ Conception rate to AI ◦ Ideal calving spread ◦ Calving mid-point required. 		

You can:	Date (✓ for competency)	
<ul style="list-style-type: none"> • Monitor cow condition pre-mating. Give your boss an update on what you think the condition score of the herd is and the actions you think are required, if any, to improve this for mating. 		
<ul style="list-style-type: none"> • Implement the mating programme for the herd under supervision: <ul style="list-style-type: none"> ◦ Apply tail paint or apply/use other heat detection aids for pre-mating and/or mating ◦ Identify on-heat cows by one of the following methods: <ul style="list-style-type: none"> • Tail paint • K-mars • Teaser bulls • Observation of behaviour and physical signs • Other recognised method: _____ ◦ Record and report heats where required ◦ Re-tail paint with new colour or replace K-mars/other aids where applicable. 		
<ul style="list-style-type: none"> • Draft cows for AI or natural mating: <ul style="list-style-type: none"> ◦ Record cows submitted for mating in the appropriate place ◦ If cows are being AI'd, have them organised for the technician. 		

You can:	Date (✓ for competency)	
<ul style="list-style-type: none"> • Record and report mating progress to your boss mating progress by calculating the daily or weekly submission rate. <p>Explain to your boss how this relates to the mating target.</p>		
<ul style="list-style-type: none"> • Discuss how each of the following will help to measure mating progress and outcomes: <ul style="list-style-type: none"> ◦ Daily or weekly submission rate ◦ Non-return rate after first cycle ◦ Conception rate after pregnancy testing. 		
<ul style="list-style-type: none"> • Monitor the health and condition of the cows and bulls throughout mating, noting and reporting any possible problems. For example: <ul style="list-style-type: none"> ◦ Non-cyclers and the reasons for these (for example, retained membranes, condition, feeding levels, minerals or diseases) ◦ Cows with long cycles ◦ Cows with short cycles ◦ Cow and bull condition ◦ Lameness ◦ Mastitis in cows ◦ Cows which have been injured by bulls ◦ Injuries to bulls. 		

Document the animal health issues you have encountered during mating and treatments you have used.

You can:

- Put bulls out with the herd on the correct date.
 - Rotate bulls and ensure there are enough bulls in the herd for the stage of mating.

Date (✓ for competency)

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Work out the bull ratio: _____

Do you think this ratio is ok? _____

Farm Report

Complete the following data collection forms in the Farm Report booklet:

- Herd/calving/mating details.

Sign Off

Date	Learner Comment	Supervisor Comment
Competency Achieved		
Learner:	Assessor (sign off unit 25378):	
	Assessor no:	
Verifier:	Date:	

Breeding

Activity 25: Mating skills

You need to implement a mating plan which had been developed for the herd you manage. Your Monthly Reports and Breeding Evidence Portfolio need to show that you can:

- Understand the on-farm mating plan and targets and how to achieve these targets.
- Understand the impact 'Planned Start of Mating' (PSM) has on calving (i.e. when is the best time to be calving and the impact of having cows still to calve when mating begins).

Implement a mating plan. For example, show that you can:

- Identify on-heat cows
- Renew tail paint, K-mars or other heat detection aids
- Draft cows for mating
- Keep mating records
- Monitor health and condition of cows
- Treat ill health
- Report mating progress to your manager
- Handle bulls and monitor health and condition
- Evaluate progress of the mating plan
- Manage a herd to achieve optimum submission and conception rates.

Verifier sign-off – Activity 25		25	
		Date	
The learner is consistently carries out the tasks listed above at a satisfactory standard.			
Name and role			
Contact details			
Comments			
Signature		Date	

Activity 26: Implementing a mating plan

Discuss the mating plan with your manager including factors such as:

- Targets and how to achieve these
- Feeding
- Pre-mating heats, number of weeks
- How are non-cyclers dealt with (for example, intervention, natural mating etc)
- Animal health programme for mating (for example, minerals, metrichecking etc)
- Interventions used (for example, CIDRs, prostaglandin etc)
- Planned start of mating – is this different for the heifers compared to the cows
- Technologies available and used on your farm
- Are the heifers AI'd or naturally mated
- Number of weeks AI
- Are bulls nominated for AI
- Breed and type of semen selected
- Any selection of cows to specific bulls made
- Number of weeks natural mating (number and breed of bulls required)
- Date of first pregnancy test.



Mating plan

Attach the mating plan used on your farm.

Follow the mating plan for your farm. Complete the “Daily Heat Summary” and the “Individual Animal Mating or In-season Details” in the LIC Mating Notebook (or Calving and Mating Notebook or Dairy Diary).

Monitor the health and condition of the cows and bulls throughout mating and report on progress and any problems in your Monthly Reports and Dairy Diary.

Present the results of the mating plan.

Verifier sign-off — Activity 26		26
		Date
The learner can implement a mating plan to meet farm targets.		
Name and role		
Contact details		
Comments		
Signature		Date

What mating technologies were used during mating? Describe how effective those technologies were.

Explain how successful implementation of the mating plan will affect the fertility of the herd. Your answer must include genetic factors.

Tutor sign off – Activity 27**27**

The learner shows understanding of the management strategies required to achieve mating targets.

The learner shows understanding of the technologies available for achieving mating targets.

The learner demonstrates an understanding of how implementing the mating plan affects the fertility of the herd.

Yes	No	Signature:	Date:
Comments:			
Re-assessment (if necessary)		Tutor name:	
Yes	No	Signature:	Date:

Graduate outcome 10

Implement a dairy livestock breeding plan

Evidence of competence (initial when completed)

Learning outcome

10.1 Implement a dairy mating programme

25

Mating skills

26

Implementing a mating plan

27

Understanding mating management

Assessor (Training Adviser)

The Monthly Reports and this Evidence Portfolio show that the learner implements management strategies to achieve farm mating plan outcomes.

Assessor name:

Comments:

Signature and date:

Appendix E – Example of data coding table

Verifier interview data	Codes
<p>Verifier A</p> <p>Evidence portfolio as an assessment method</p> <ul style="list-style-type: none"> Has more opportunity to get evidence from the trainee than under the previous system. Trainee has to provide more details. <ul style="list-style-type: none"> For example Feeding. Under old work diary system trainee had to show they had done a farm walk and obtained the data. Under the new system they have to obtain the data and then present it and discuss it. Gives the verifier more evidence with which to make a decision. New E.P. system makes it easier to have the three way discussion between the verifier, trainee and assessor as there is more information available. Means verifier is more confident in making a decision. <p>How well does E.P. relate to theory/knowledge necessary for their job?</p> <ul style="list-style-type: none"> Good. Trainee will discuss the theory/knowledge activities with verifier to assist with learning and assessment. New E.P. matches the theory/knowledge up with on-farm practical well. Better than the old system. Trainee asks better questions of the verifier which reinforced the classroom learning Trainee seems to make better connections between the theory/knowledge and the on-farm practical <p>Training Adviser involvement in assessment process</p> <ul style="list-style-type: none"> No assessment visit yet. <p>General comment</p> <ul style="list-style-type: none"> More involvement or effort is required from the trainee under this method. Having to collect this evidence makes them get more involved in the system and understand it better Too early to tell if the programme has resulted in an increase in on-farm performance. 	<p>Evidence</p> <p>Evidence</p> <p>Discussion Information Confident</p> <p>Discussion Learning Relates</p> <p>Questioning Questions Connection</p> <p>Effort Evidence Involvement</p>

<p>Verifier B</p> <p>Evidence Portfolio as an assessment method</p> <ul style="list-style-type: none"> • Is straightforward and easy to use • It is much easier to follow what he is learning in class as the theory/knowledge assessment is in the same place. Makes it much easier to help him with this. • This format would have been better for the previous programme he did also as the verifier would have had more visibility over his work to help him prepare better. • New E.P. is good in helping trainee plan what work he has to achieve before the next class. This is important for him as he does not read well. • Found that some of the wording of the questions was a bit difficult for trainee to understand, but could have been because of his learning difficulty. <p>How does E.P. relate to knowledge trainees need to do their job?</p> <ul style="list-style-type: none"> • The E.P. relates what he learns in class to the farm very well. All the evidence he has to collect for the E.P. comes from what is actually going on on-farm. • On-farm evidence such as Health and Safety meetings, production records and herd records are required for the E.P. this is really good as it helps him relate his farm to what he is learning. <p>Verifier involvement in assessment process</p> <ul style="list-style-type: none"> • Verifier/trainee discussions have definitely helped him understand both the theory/knowledge component of the course better, as well as the on-farm practice. • Verifier now has much better insight into what trainee is learning in class with the new E.P. which is important. • Monthly reports are useful in helping him get involved in the running of the farm. • Verifier sign off with new E.P. is better as it requires trainees to produce more evidence than old work diary did so is easier to make better decisions. <p>Assessor involvement in assessment process</p> <ul style="list-style-type: none"> • This was good. Process was similar to how it used to work with the old work diary from verifier's perspective • It took a bit of time to understand how the E.P. works as it was new, but was pretty straightforward. 	<p>Oversight</p> <p>Visibility Involvement</p> <p>Difficult</p> <p>Relates Evidence Evidence On-farm Evidence Relates Good/better</p> <p>Discussion Learning Visibility Applying Evidence</p> <p>Time</p>
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<p>Comparison with old method</p> <ul style="list-style-type: none"> • <u>New method is better.</u> Main reasons: <ul style="list-style-type: none"> ○ Easier to understand ○ Relates well to farm on a daily basis as trainee is having to use this information as part of his assessment evidence ○ Makes the trainee go and find the information he needs on farm which helps him to understand it • Trainee has some reading and writing difficulties. The new E.P. method is <u>much better</u> for him as there is less writing. Seems to work better for him. Don't think he would have coped with this Level 4 programme under the old assessment system as there was too much information and writing. • This programme is helping him understand the "why" behind a lot of the practical tasks he does. 	<p>Good/better</p> <p>Relates Evidence Effort Good/better Connection</p>
<p>Verifier C</p> <p>Evidence portfolio as an assessment method</p> <ul style="list-style-type: none"> • Found it a bit confusing initially as to which parts the verifier was meant to do. Trainee needed to be more proactive in attempting the theory/knowledge assessment activities before asking for help. • It is helpful having the theory/knowledge visible in the E.P. as it is easier to relate to what Verifier is talking about practically. It is good seeing what they have gone over in class so verifier knows what to cover with them. Assists in assessment conversation. <p>How well does E.P. relate to theory/knowledge needed to do their job?</p> <ul style="list-style-type: none"> • Doing practical activities such as farm walks as part of the theory/knowledge assessment definitely helps trainee make sense of the theory/knowledge they are learning. • It would have worked better for the verifier if she had been involved on a more regular basis. Happy to help more but trainee needs to take responsibility to discuss E.P with verifier more frequently. This particular trainee – have had others who were better at this. <p>Training Adviser involvement in assessment process</p> <ul style="list-style-type: none"> • Have not had an assessment visit from the Training Adviser yet 	<p>Confusing</p> <p>Relates Oversight Conversations</p> <p>Make sense</p>

<p>General comment</p> <ul style="list-style-type: none"> • New E.P. seemed a bit more logical to go through. It worked well and “was helpful having the theory visible for the practical we are trying to teach” • He needed to have done some of the theory/Knowledge assessment before the verifier could sign off on the practical. To do the practical he had to have understood some theory. • Overall, felt that the E.P. does a good job of applying theory/knowledge to a practical situation • Doesn't have a particular preference between old W.D and new E.P. but found it difficult to compare assessment methods between different programmes. • Felt it was useful having all the assessments in one place (in E.P.) as less likely to lose assessments. 	<p>Connection</p> <p>Applying</p>
<p>Verifier D</p> <p>Evidence portfolio as an assessment method</p> <ul style="list-style-type: none"> • Likes the new E.P. Main reason is that theory/knowledge is being learnt at the same time it is being done practically on the farm. <ul style="list-style-type: none"> ◦ E.g. Milk quality – Trainee was learning about this and they were having somatic cell count issues on farm at the same time. The assessment the trainee was doing was based on what was actually happening on farm. • Compared to old assessment methodology the new E.P. seems more enjoyable. The old system just seemed like doing homework – filling in assessments. <p>How well does E.P. relate to theory/knowledge necessary for their job?</p> <ul style="list-style-type: none"> • The theory/knowledge activities in the E.P. made sense based on what happens on farm, although there were some that were not relevant to this particular farm. • The trainee was learning some things the verifier did not know but saw it as a good opportunity to learn himself • Verification process with the trainee worked well as trainee took responsibility to come to verifier as needed. • Had difficulty finding good benchmarking information. <p>Assessor involvement in assessment process</p> <ul style="list-style-type: none"> • The assessment process with assessor worked well. 	<p>Timing</p> <p>On-farm</p> <p>Engaged</p> <p>Good/better</p> <p>Make sense</p> <p>Visibility</p> <p>Effort</p>

<ul style="list-style-type: none"> • The assessor asked questions of him and looked for sufficient evidence of what the trainee could do. • This process with the assessor was similar to how it worked with old work diary. <p>General comment</p> <ul style="list-style-type: none"> • Some areas were identified where the theory/knowledge assessment is partially based on on-farm performance <ul style="list-style-type: none"> ○ Diagnosis of metabolic diseases at calving time. Trainees generally don't fully understand this until they actually have to diagnose and treat them themselves. ○ Farm walks and feed allocation. Verifier has seen an improvement in trainee's practical performance in this area since he has learnt the theory. • Overall, prefer the new E.P. to old W.D and written assessment method. Main reasons are: <ul style="list-style-type: none"> ○ It is better as it has the theory/knowledge in it alongside the practical. ○ Better than just answering questions in a written theory assessment. "it has more value in it and is better landed on the real life" (Verifier is not a native English speaker). ○ Under the old system, the answers to the theory assessments were based on what the tutor expected. With the new E.P. there is room for a wider range of answers as it is based on own farm. Doing the assessments based on what is happening on own farm is very good. ○ It is more connected to what is happening on the farm ○ No problems/issues with it as far as he is concerned. • Having visibility over the theory/knowledge in the E.P. is useful as he can go through it all when doing the practical assessment. This gives the verifier a lot more confidence in putting his signature to it. 	<p>Evidence</p> <p>Performance</p> <p>Applying</p> <p>Prefer Connection Questions Relates</p> <p>Range On-farm Connection Visibility Information Interaction Confident</p>
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Verifier E

Evidence portfolio as an assessment method

- E.P is definitely better than old W.D method. It is broken down into smaller activities so easier to understand and less writing.
- Helped having the theory/knowledge in the E.P. when signing off practical. E.g. for the pasture management activities.

How well does E.P. relate to theory/knowledge needed to do their job?

- Activities in E.P. relate well to what is happening on farm.
- Better than the old system where verifier never got to see the theory/knowledge learning and assessment.
 - E.g. Milk Quality. Activities in E.P. related well to on-farm practical activities

Training Adviser involvement in assessment process

- Haven't done this yet

General comment

- Definitely prefer the new system.
 - Having the theory/knowledge assessment in E.P. helps with the assessment conversations with the trainee. Makes it easier to ask questions.
 - More information in there to help make decisions about competence
 - Definitely get a better sense of trainees understanding of theory/knowledge by having all assessment together in E.P.
 - Noticed that trainee is asking a lot more questions under new system. He seems to be enjoying it more and is more engaged than last course.

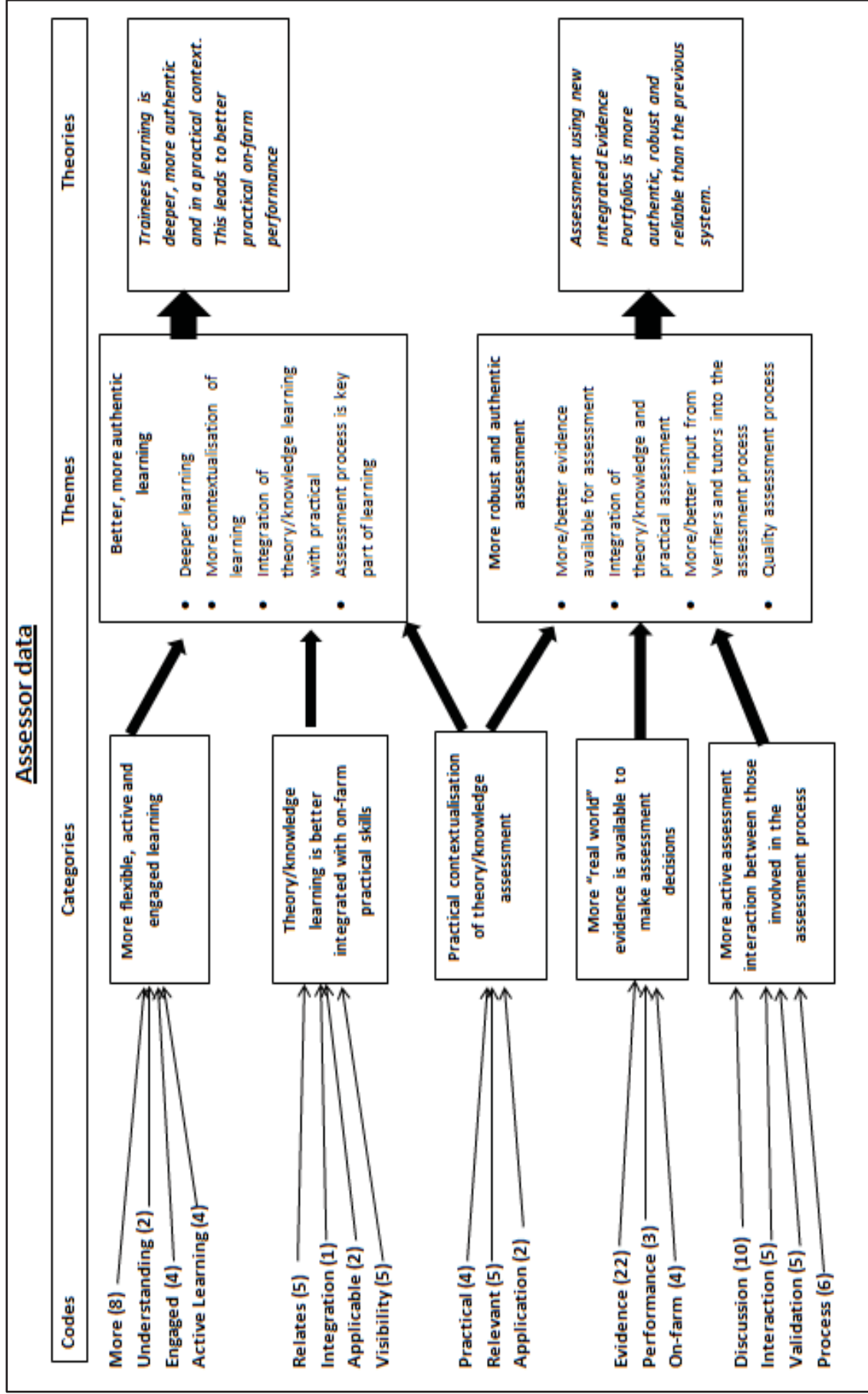
Good/better Information

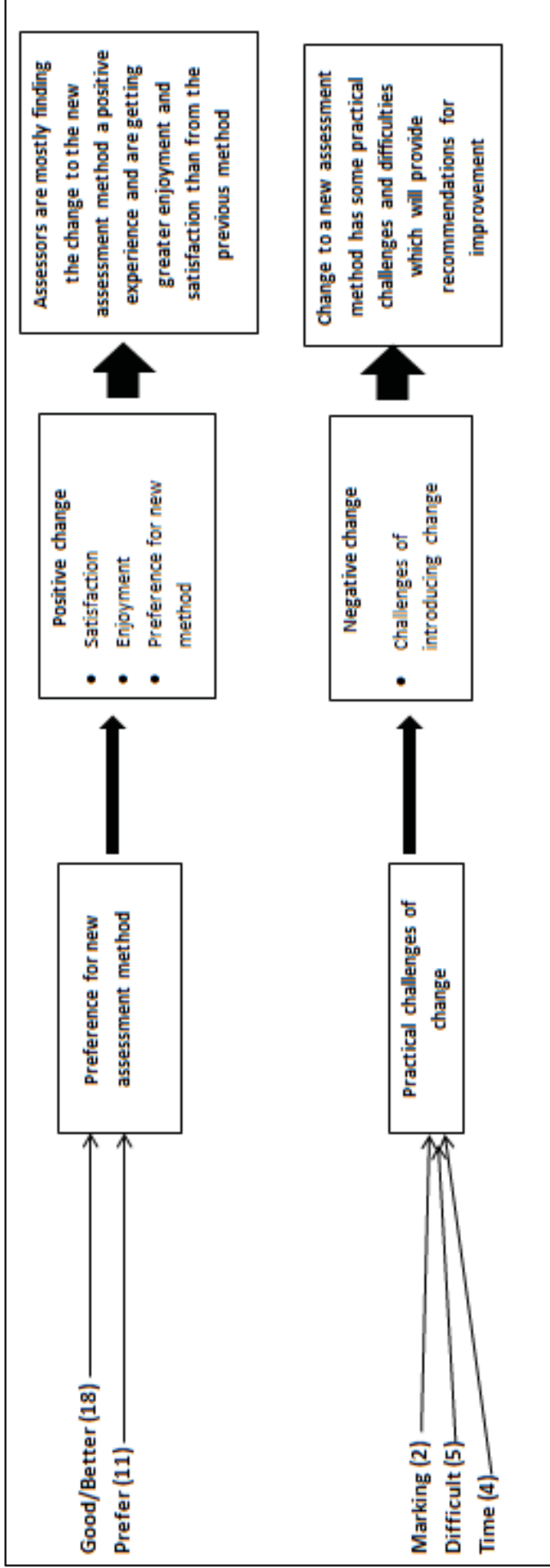
Relates Good/better Oversight Relates

Prefer Conversations Questions Information Range

Questioning Engaged

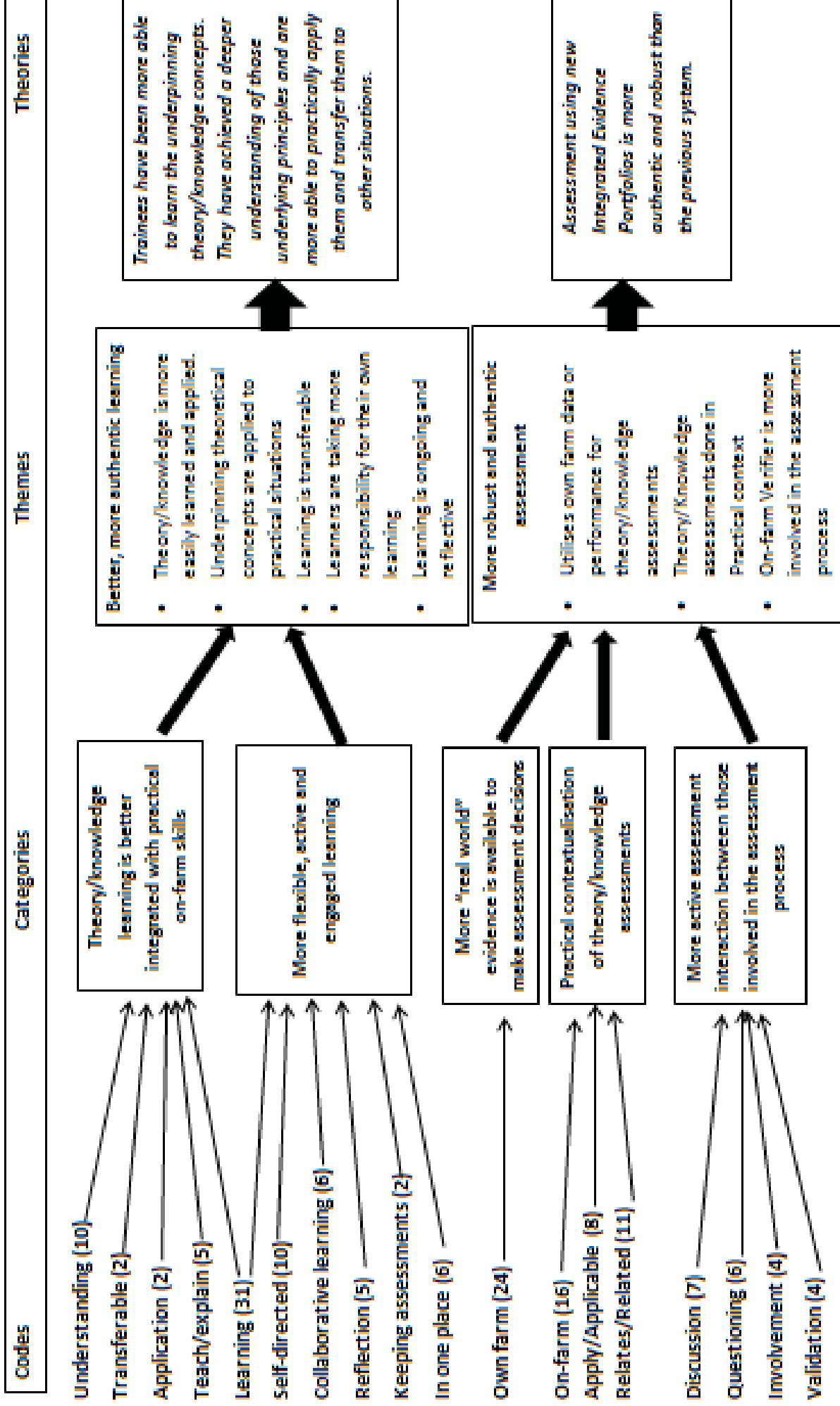
Appendix F- Data coding charts

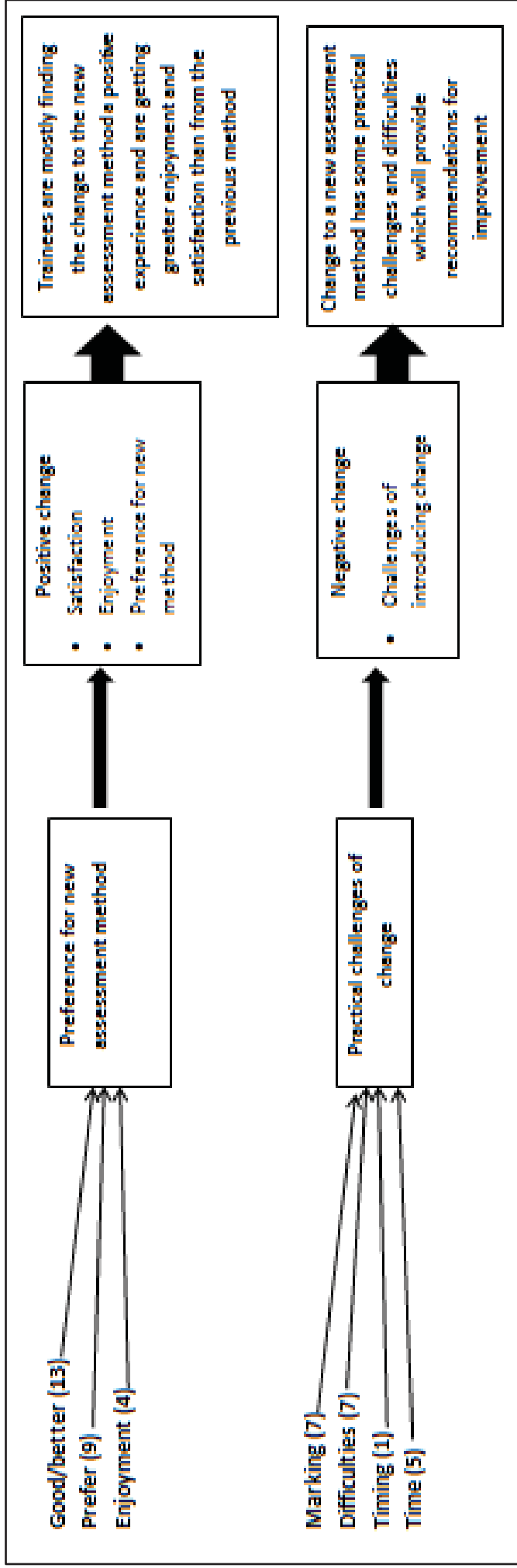




Code	Frequency	Explanation/Context	Category
More	8	More/better/deeper engagement with learning and assessment	More flexible, active and engaged learning
Understanding	2	Better understanding of theory/knowledge	
Engaged	4	Trainees more engaged in their learning and assessment	Theory/knowledge learning is better integrated with on-farm practical skills
Active learning	4	Trainees actively constructing learning	
Relates	5	Theory/knowledge <i>learning</i> relates to on-farm practical	Practical contextualisation of theory/knowledge assessment
Integration	1	Theory/knowledge <i>learning</i> is integrated with on-farm practical	
Applicable	2	Theory/knowledge <i>learning</i> is applicable to on-farm practical	More “real world” evidence is available to make assessment decisions
Visibility	5	Verifiers have more/better visibility over what Trainees are learning in class	
Practical	4	Practical assessment is integrated with theory/knowledge in Evidence Portfolio	More active assessment interaction between those involved in the assessment process
Relevant	5	Practical assessment is relevant to theory/knowledge in Evidence Portfolio	
Application	2	Theory/knowledge <i>assessment</i> is applicable to on-farm practical assessment	Preference for new assessment method
Evidence	22	Wider range of, more examples of, greater depth of evidence for assessment	
Performance	3	Use of on-farm performance as evidence for assessment in Evidence Portfolio	Practical challenges of change
On-farm	4	Use of on-farm evidence for assessment in Evidence Portfolio	
Discussion	10	More/better assessment discussion between Assessor/Verifier/Trainee	Practical challenges of change
Interaction	5	More/better interaction between Assessor/Verifier/Trainee	
Validation	5	More/better validation of assessment evidence	Practical challenges of change
Process	6	New assessment process led to better quality assessment	
Good/better	18	New Evidence Portfolio assessment method was preferred over previous method	Practical challenges of change
Prefer	11	New Evidence Portfolio assessment method was preferred over previous method	
Marking	2	Issue with Tutors being able to keep up with marking	Practical challenges of change
Difficult	5	Some difficulties with new assessment method	
Time	4	Took time to learn how to use the Evidence Portfolio	Practical challenges of change

Trainee data





Code	Frequency	Explanation/Context	Category
Understanding	10	Better understanding/was easier to understand	Theory/knowledge learning is better integrated with practical on-farm skills
Transferable	2	Was able to transfer learning	
Application	2	Was able to apply learning to practical situations	
Teach/Explain	5	Was able to teach others/explain concepts or understanding	
Learning	31	Was easier/better/more of it/more applied	
Self-directed	10	Learning/research/looking for answers/digging deeper	
Collaborative learning	6	More opportunities for peer to peer learning	
Reflection	5	Looking back on concepts previously learnt	
Keeping assessments	2	Retain possession of Theory/knowledge assessment documents (didn't under previous system)	
In one place	6	All assessments (Theory/knowledge and practical) in one place in the Evidence Portfolio	
Own farm	24	Evidence Portfolio uses data/examples/performance from trainees own farm	More "real world" evidence is available to make assessment decisions
On-farm	16	Theory/knowledge assessment activities are in the context of on-farm practical situations	Practical contextualisation of theory/knowledge assessments
Apply/Applicable	8	Theory/knowledge assessment activities are applied to on-farm practical situations	
Relates/Related	11	Theory/knowledge assessment activities relate to on-farm practical situations	More active assessment interaction between those involved in the assessment process
Discussion	7	More/better assessment discussions between trainee and Verifier	
Questioning	6	More/better questioning of Trainees to Verifiers, and Verifiers to Trainees, during assessment process	
Involvement	4	More/better involvement of Verifiers in the assessment process	
Validation	4	More/better validation of assessment evidence	Preference for new assessment method
Good/better	13	New Evidence Portfolio assessment method was good/better than previous method	
Prefer	9	New Evidence Portfolio assessment method was preferred over previous method	
Enjoyment	4	Participants are getting more enjoyment out of new method	Practical challenges of change
Marking	7	Issue with Tutors being able to keep up with marking	
Difficulties	7	Difficulties with using new Evidence Portfolio	
Timing	1	Timing of theory/knowledge learning not matching up with on-farm practical	
Time	5	Limited time for learning and/or assessment	

Verifier data

Codes

Learning (2)
 Make sense (4)
 Questioning (5)
 Involvement (4)
 Effort (4)
 Engaged (5)

More flexible, active and engaged learning

Categories

Themes

Theories

Better, more authentic learning

- Better engagement
- More flexible learning
- Better contextualisation
- Integrated learning
- Assessment for learning

Trainees learning is deeper, more authentic and in a more practical context.
 Theory/knowledge concepts are applied to practical situations which leads to improved on-farm performance

Connection (7)
 Relates (12)
 Applying (8)
 On-farm (11)

Theory/knowledge learning is better integrated with practical, on-farm skills

Discussions (4)
 Questions (4)
 Conversations (3)
 Interaction (5)
 Confident (2)

More active assessment interaction between those involved in the assessment process

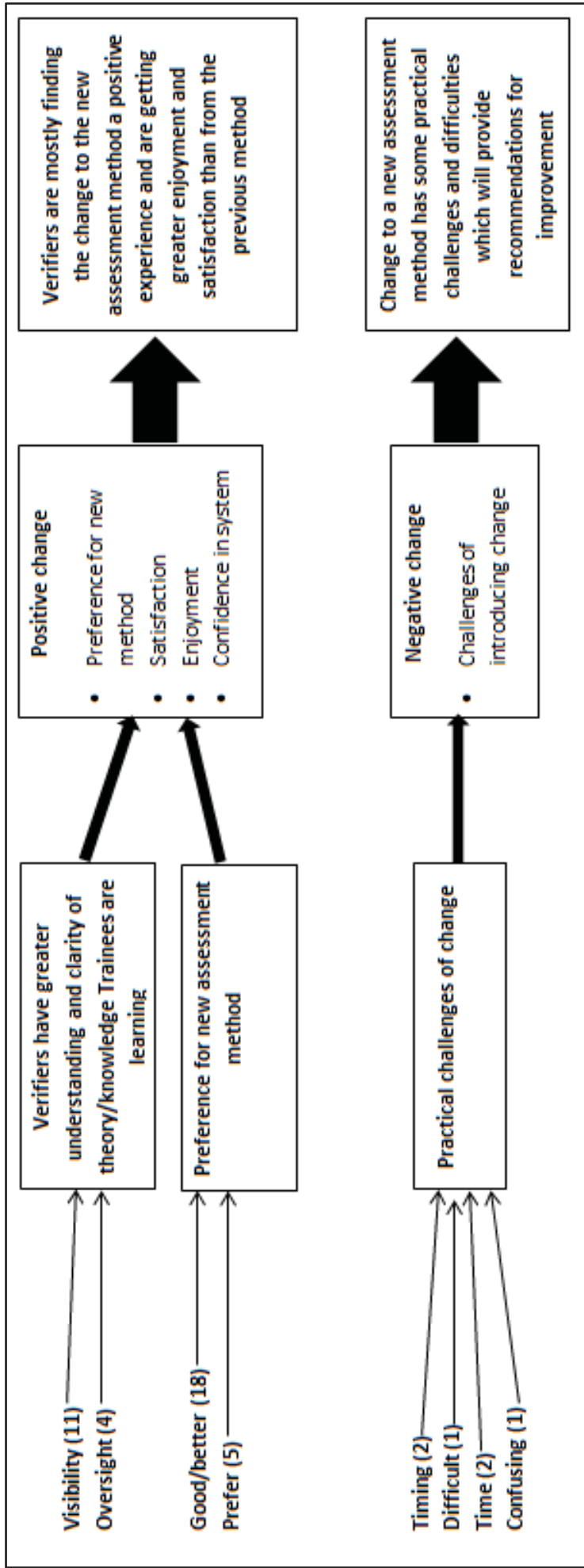
Robust and Authentic assessment

- Better process
- More evidence
- More interaction
- Quality process

Assessment using new Integrated Evidence Portfolio method is more authentic, robust and reliable than the previous system

Evidence (12)
 Information (8)
 Performance (4)
 Range (6)

More "real world" evidence is available to make assessment decisions



Code	Frequency	Explanation/Context	Category
Learning	2	Trainees found learning easier/better	More flexible, active and engaged learning
Make sense	4	Trainees able to make sense of/understand concepts better	
Questioning	5	Trainees asking more/better questions of the Verifier to learn	
Involvement	4	More involvement by the trainees in their learning and assessment	
Effort	4	Trainees putting more effort into their learning and assessment	
Engaged	5	Trainees more engaged in their learning and assessment	Theory/knowledge learning is better integrated with practical, on-farm skills
Connection	7	Better connections between theory/knowledge and practical	
Relates	12	Theory/knowledge relates to practical learning	
Applying	8	Trainees are applying theory/knowledge to practical situations	
On-farm	11	Evidence from Trainees own farm is utilised for learning and assessment	
Discussion	4	More/better assessment discussion between Verifier and Trainee	More active assessment interaction between those involved in the assessment process
Questions	4	Verifiers asking more/better questions of Trainees as part of the assessment process	
Conversations	3	Verifiers having better assessment conversations with Trainees	
Interaction	5	More/better interaction between Verifiers and Trainees, as part of the assessment process	
Confident	2	Verifiers have more confidence in their assessment decisions	
Evidence	12	More/better evidence available for Verifiers to use as part of the assessment process	More "real world" evidence is available to make assessment decisions
Information	8	More information available for Verifiers to use in the assessment process	
Performance	4	Trainees on-farm performance used as evidence for the assessment process	
Range	6	Wider range of evidence available to Verifiers for the assessment process	
Visibility	11	Verifiers have more/better visibility over what Trainees are learning in class	
Oversight	4	Verifiers have a greater understanding of what trainees are learning	Verifiers have greater understanding and clarity of theory/knowledge Trainees are learning
Good/better	18	New Evidence Portfolio assessment method was good/better than previous method.	
Prefer	5	New Evidence Portfolio assessment method was preferred over previous method	
Timing	2	Timing of classroom-based learning did not line up with on-farm activities	
Difficult	1	Difficulty using Evidence Portfolio	
Time	2	Took time to learn how to use the Evidence Portfolio	Practical challenges of change
Confusing	1	Found Evidence Portfolio confusing initially	

Appendix G – Approval letter from G.M. – Field Operations



25 September, 2015

Human Ethics Committee
Massey University

To whom it may concern,

Research project permission for Graeme Couper

Primary ITO fully supports the research project Graeme is engaged in and we are looking forward to the results, to help us make sure we are delivering a learning and assessment process that is the best it can be for our industry stakeholders.

As acting G.M. – Field Operations, I am happy to give my permission for Graeme to involve our Training Advisers and their trainee and employer clients in his research project, as outlined to me in the Research Proposal outline and the letter requesting permission that he sent me.

If you have any further questions or need any more information from me, please don't hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read "Tracey Shepherd".

Tracey Shepherd
Acting GM – Field operations
Primary ITO

Agriculture Horticulture Water Equine Sports Turf Food Processing

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Appendix H – Massey University Ethics Approval



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

3 December 2015

Graeme Couper
28 Vasanta Avenue
Ngaio
WELLINGTON 6035

Dear Graeme

Re: HEC: Southern B Application – 15/71
Knowing by Doing: What does performance of practical workplace tasks tell us about learner's knowledge? – An evaluative case study

Thank you for your letter dated 2 December 2015.

On behalf of the Massey University Human Ethics Committee: Southern B I am pleased to advise you that the ethics of your application are now approved. Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

A handwritten signature in black ink, appearing to be 'R. Stewart-Withers'.

Dr Rochelle Stewart-Withers, Chair
Massey University Human Ethics Committee: Southern B

cc Dr Jenny Poskitt
Institute of Education
PN500

Dr Alison Sewell
Institute of Education
PN500

Prof John O'Neill, Director
Institute of Education
PN500

Mrs Roseanne MacGillivray
Institute of Education
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Massey University Human Ethics Committee
Accredited by the Health Research Council

Research Ethics, Research and Enterprise

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Post-Graduate Research into Primary ITO assessment methods

Background

The purpose of this research project is to look at how well the assessment process we have set up for the new pastoral qualifications works. This is about having more of the theory assessment done as part of the on-farm evidence portfolio rather than as written assessment done by the tutor. Specifically, the research is intended to address following research questions:

- I. What does practical performance of workplace tasks reveal about learners' related or underpinning knowledge?*
- II. How does practical performance of workplace tasks compare with traditional written methods for assessing knowledge, from learners', employers' and assessors' perspectives?*

How will it work?

The study involves three separate groups of people. We need trainees who are enrolled in one of the new programmes that are using this new method of assessment, and they need to have recently been enrolled in one of the old qualifications also, so they can compare the two methods. We will also need the employers or workplace verifiers of those trainees to agree to be involved. Finally, the Training Adviser for those trainees will be involved, as the assessor.

We need two groups of 8 – 10 trainees, in two separate geographic locations – preferably one in the North Island and one in the South Island. The trainees need to be enrolled in one of three of the new qualifications:

- Level 4
- Level 3 Livestock Husbandry
- Level 3 feeding (Pastoral Livestock Production)

They would also need to have been enrolled in any one of the qualifications below in 2015, or at a pinch, 2014:

- Level 3 Health and Husbandry
- Level 3 breeding and mating
- Level 3 livestock feeding

The trainees would need to be approached and asked if they were interested in participating in the study. If they are, their employer or on-farm verifier also needs to agree to participate and finally you, as their Training Adviser need to agree to participate.

There is not much involved from the participants point of view. It would be an initial set-up interview (Jan/Feb), and then a final interview (June/July). The participants don't have to do anything different

– just get on with their training. The point of the study is to find out from them how they found the new assessment process and how it compared to the old way.

If you are interested in participating in the study, and have trainees that meet the above criteria and you believe they and their employers might also be interested then please let me know. Please don't approach any trainees or farmers about being involved until you have contacted me.

Once prospective participants have been identified, they will get some further information and I can talk to the Training Advisers about approaching them and their farmers to be involved.

Appendix J – Details of study for participants

Research project on assessment methods – information for potential participants

Introduction

This information sheet is for people who may be interested in participating in this research project. It is designed to give you enough information about the research project so you can make an informed decision about whether or not you would like to be involved. There is no compulsion to be involved and you may, after reading this information sheet and discussing the research project with your Training Adviser decide that you are not interested in being involved.

Researcher – Graeme Couper. I am the Education Manager at Primary ITO and am carrying out this research project to contribute towards a Master's Degree in Education. I can be contacted on 0274 525 433 or at graeme.couper@primaryito.ac.nz if you have any questions about this research or your participation in it

Background – Reasons for doing the research

Primary ITO will be introducing the programmes based around the new qualifications in the dairy and sheep & beef farming sectors in January 2016. These qualifications are different to the way qualifications have been in the past. Instead of being based on unit standards, they are based on Graduate Outcomes; which are statements about what graduates from the qualification will know, the skills they will have and the behaviour they will demonstrate in the workplace. Because of this, the assessment process for these new qualifications will be different to what you may have been used to when you have been involved in Primary ITO programmes in the past.

Previously, trainees have been assessed in the practical skills required for the qualification, based on their performance of on-farm tasks. The performance of these tasks is verified by their workplace employer or supervisor in a “work diary” and final assessment of these skills is done by Primary ITO Training Advisors (assessors) based largely on the evidence the verifier provides.

The knowledge/theory parts of the qualification have been taught and assessed by tutors. This teaching has been mostly classroom based and the knowledge/theory assessments have been mostly by way of open book, short answer, written tests.

The assessment for the new qualifications will be done by way of an evidence portfolio which will include both on-farm and knowledge-based assessments. One of the main reasons for changing the way the programmes are taught is to try and make sure trainees have a better understanding of how the knowledge/theory they learn applies to their workplace. This has been extended to the assessment process because we recognise that, if the reason for learning the knowledge/theory is to apply it to the workplace, it makes sense that a better way to assess if trainees have understood that knowledge/theory is to see how they use it as part of their job, rather than sitting a written test.

The purpose of this research project is to see how well this new approach to assessing knowledge/theory works, and whether it is better than the old way. Because the people involved in

this process are trainees, employers and assessors (Training Advisers) we want to hear from all three of these groups, how well it works from their perspective.

Who is involved?

The study involves three separate groups of people. Firstly, we have identified Training Advisers who are willing to be involved. They have then identified any of their trainees who may be eligible to be involved. We need trainees who are enrolled in one of the new programmes that are using this new method of assessment, and they need to have recently completed one of the old qualifications, so they can compare the two methods. We will also need the employers or workplace verifiers of those trainees to agree to be involved.

Do I have a choice?

Definitely! The only people involved in the study will be people who want to participate. Anyone who does decide to be a part of the study has the right to withdraw from the study, at any stage, for any reason. Anyone who is involved in the study and then withdraws, or chooses not to be involved, for any reason, will not be disadvantaged in any way.

Will my information be private?

Yes. The only people who will see any information you give out as part of the study, that can identify you, will be the researcher and the Massey University supervisors. When the research project is marked, as part of the researcher's degree, and if the results of the study are published, all names or any other information that could identify any of the participants will be removed.

How will it work?

The purpose of the study is to get your opinion, as a learner, workplace verifier or Training Adviser, on how well the new assessment method is working, and how it compares to the old way. This will be done by doing an interview with the researcher, after approximately six months of doing the new programme. This interview will ask a number of questions about the learning and assessment process and how it compares to your previous experience in other training you have been involved in with Primary ITO. These interviews are designed to get your opinion. There are no right or wrong answers, and you will have the opportunity to give any information you wish to about your training experiences with Primary ITO. The research is not attempting to justify a position or reach a pre-determined conclusion. The only purpose of the research is to find out how well the new system works, and if it is better than the old one, based on the opinion of those people who are involved in it.

How much time will it take?

The study will take approximately 5 – 6 months; however the amount of time you will need to spend to be involved is minimal. Most of the study is about you doing what you would normally do as part of a Primary ITO training programme, as a trainee, workplace verifier or Training Adviser. The only specific, extra time you will need to spend to be involved in the study is:

- An initial meeting with the researcher. This will happen at the beginning of the study, in December 2015 or January 2016 and the purpose of it is so you can meet the researcher and make sure you fully understand what the study is about and what the expectations of all parties are. This meeting is likely to take about 30 minutes, at a time arranged between you and the researcher. For trainees and workplace verifiers, this initial meeting could be done together if both trainee and workplace verifier agree to this. The researcher will come and visit you in your workplace, unless you would prefer to hold the meeting somewhere else.
- The researcher will contact you at least once during the period of the study, by phone, email or text, depending on what you would prefer. The purpose of this is to make sure you are still happy to be involved and answer any questions or concerns you may have. This should take no more than 5 – 10 minutes
- At the end of the study period, in May – June 2016 you will have an interview with the researcher to find out your thoughts on the assessment process. The interview will be informal, and while the researcher will be looking for your opinion for a number of questions, there will be plenty of opportunity for you to give your thoughts on any aspects of the training and assessment you have been doing. This interview will be held in your workplace, at a time arranged between you and the researcher, and would only involve you and the researcher. It is likely to take 30 – 45 minutes. Note that the end of the study period, when you are interviewed by the researcher in May/June, will not necessarily be the end of the training programme you or your trainee is enrolled in. This will continue for the normal duration of that particular programme. The reason for limiting the period of the study to six months is to allow enough time for the participants to engage in the training programme, to be able to give their opinions about it, but to make sure the researcher has enough time to analyse the data and write up the study to meet the Massey University deadline of November 2016.

Appendix K – Interview questions

Interview questions – Trainees

Section 1 - Current programme

1. How do you feel about the current programme you are enrolled in?
 - Have you enjoyed the way you have learnt the knowledge or theory for this programme? Why or why not?
2. What do you think of the Evidence Portfolio as an assessment method?
 - Can you give a couple of reasons or examples of why you feel this way about it?
3. How well do you think the activities in the Evidence Portfolio, (either written or practical activities) relate to what you have learnt from your tutor?
 - What examples can you give of when you felt it **did** relate well and why you felt that way?
 - What examples can you give of when you felt it **didn't** relate well and why you felt that way?
4. How did you feel about the involvement of your **farmer/verifier** in the assessment process?
 - What examples can you give of when you felt this **worked well** and why you thought it did?
 - What examples can you give of where you felt this **didn't work well** and why you thought it didn't?
5. How did you feel about the involvement of your **Training Adviser** in the assessment process?
 - What examples can you give of when you felt this worked well and why you thought it did?
 - What examples can you give of where you felt this didn't work well and why you thought it didn't?
6. For those parts of the Evidence Portfolio that you have completed so far in this programme, how confident are you that you understand the knowledge or theory that you have learnt?
 - What examples can you give of an area where you feel you understand it well?
 - How well do you think you could explain it to one of your classmates if they were struggling with it?
 - If you changed jobs and were working on a different farm this time next year, how well do you think you would know it?

7. For those parts of the Evidence Portfolio that you have completed so far in this programme, what did you think of the assessment you have done, using the Evidence Portfolio.
 - What examples can you give of something you **particularly liked** about it and why you did?
 - What examples can you give of something you **didn't particularly like** about it and why you didn't?

Section 2 – Comparison with previous programme

8. Relating back to question 1 about how much you have enjoyed your learning during this programme; how does it compare to the previous programme you did with Primary ITO?
 - What examples can you give of how you found it **better, or more enjoyable** than the previous programme, and why this was?
 - What examples can you give of how you found it **worse, or less enjoyable** than the previous programme, and why this was?
9. How does using the Evidence Portfolio as an assessment method compare to the work diary and written assessments you used during your last programme with Primary ITO?
 - What examples can you give of where you found it **better** and why you did?
 - What examples can you give of where you found it **worse** and why you did?
10. Think about the involvement your **farmer/verifier** had in the assessment process during the previous programme you did with Primary ITO. How did it compare to this programme?
 - What examples can you give of where you felt their involvement **was better** during this programme than the last programme you did? Why did you feel that it was?
 - What examples can you give of where you felt their involvement **was worse** during this programme than the last programme you did? Why did you feel that was?
11. Think about the involvement your **Training Adviser** had in the assessment process during the previous programme you did with Primary ITO. How did it compare to this programme?
 - What examples can you give of where you felt their involvement **was better** during this programme than the last programme you did? Why did you feel that was?
 - What examples can you give of where you felt their involvement **was worse** during this programme than the last programme you did? Why did you feel that was?

Section 3 – Overall comments

12. Comparing the two different programmes, overall which assessment method did you prefer? What examples or reasons can you give why you preferred that particular method?
13. Do you have any further comments or suggestions you would like to make about the new training programme you have been doing this year?

Interview questions – Workplace verifier

Section 1 - Current programme

1. What do you think of the Evidence Portfolio as an assessment method?
 - a. Can you give a couple of reasons or examples of why you feel this way about it?

2. How well do you think the activities in the Evidence Portfolio, (either written or practical activities) relate to the knowledge the trainees need to do their job effectively?
 - a. What examples can you give of where you feel they ***do relate well***, and why they do?
 - b. What examples can you give of where you feel they ***don't relate well*** and why they don't?

3. What was your involvement in the assessment process, as the workplace verifier?
 - a. What examples can you give of when you felt this ***worked well*** and why you felt it did?
 - b. What examples can you give of where you felt this ***didn't work well*** and why you felt it didn't?

4. What is your opinion about the involvement of the Training Adviser in the assessment process?
 - a. What examples can you give of when you felt this ***worked well*** and why you felt it did?
 - b. What examples can you give of where you felt this ***didn't work well*** and why you felt it didn't?

5. For those parts of the Evidence Portfolio that your trainees have completed so far in this programme, what did you think of the assessment process you have been through with them?
 - a. What examples can you give of things you ***particularly liked*** about it and why you did?
 - b. What examples can you give of things you ***didn't particularly like*** about it and why you didn't?

Section 2 – Comparison with previous programmes

6. From your point of view, as the workplace verifier in the assessment process, how does using the Evidence Portfolio as an assessment method compare to the work diary and written assessments your trainees used during their last programme with Primary ITO?
 - a. What examples can you give of where you thought it was **better** and why you did?
 - b. What examples can you give of where you thought it was **worse** and why you did?
7. Think about the involvement you, as workplace verifier had in the assessment process during the previous programmes your trainees did with Primary ITO. How did it compare to these programmes?
 - a. What examples can you give of where you felt your involvement **was better** during these programmes than the last programmes they did? Why do you think that was?
 - b. What examples can you give of where you felt your involvement **was worse** during these programmes than the last programmes they did? Why do you think that was?
8. Think about the involvement the Training Adviser had in the assessment process during the previous programmes your trainees did with Primary ITO.
 - How did it compare to this programme?
 - What examples can you give of this?

Section 3 – Overall comments

9. Comparing the two different programmes, overall, which assessment method did **you** prefer? Why did you prefer that particular method?
10. Comparing the two different programmes, overall, which assessment method do you think **the trainees** preferred? What reasons or examples can you give of why you feel they preferred that particular method?
11. What other comments or suggestions would you like to make about the new training programme your trainees have been doing this year?

Interview questions – Training Adviser (Assessor)

Section 1 - Current programme

1. What do you think of the Evidence Portfolio as an assessment method?
 - a. Can you give a couple of reasons or examples of why you feel this way about it?

2. How well do you think the activities in the Evidence Portfolio, (either written or practical activities) relate to the knowledge the trainees need to do their job effectively?
 - a. What examples can you give of where you feel they ***do relate well***, and why they do?
 - b. What examples can you give of where you feel they ***don't relate well*** and why they don't?

3. What was your involvement in the assessment process, as the assessor?
 - a. What examples can you give of when you felt this ***worked well*** and why you felt it did?
 - b. What examples can you give of where you felt this ***didn't work well*** and why you felt it didn't?

4. What is your opinion about the involvement of the workplace verifiers in the assessment process?
 - a. What examples can you give of when you felt this ***worked well*** and why you felt it did?
 - b. What examples can you give of where you felt this ***didn't work well*** and why you felt it didn't?

5. For those parts of the Evidence Portfolio that your trainees have completed so far in this programme, what did you think of the assessment process you have been through with them?
 - a. What examples can you give of things you ***particularly liked*** about it and why you did?
 - b. What examples can you give of things you ***didn't particularly like*** about it and why you didn't?

Section 2 – Comparison with previous programmes

6. From your point of view, as the assessor in the assessment process, how does using the Evidence Portfolio as an assessment method compare to the work diary and written assessments your trainees used during their last programme with Primary ITO?
 - a. What examples can you give of where you thought it was **better** and why you did?
 - b. What examples can you give of where you thought it was **worse** and why you did?

7. Think about the involvement you, as assessor had in the assessment process during the previous programmes your trainees did with Primary ITO. How did it compare to these programmes?
 - a. What examples can you give of where you felt your involvement **was better** during these programmes than the last programmes they did? Why do you think that was?
 - b. What examples can you give of where you felt your involvement **was worse** during these programmes than the last programmes they did? Why do you think that was?

8. Think about the involvement the workplace verifiers had in the assessment process during the previous programmes your trainees did with Primary ITO.
 - How did it compare to this programme?
 - What examples can you give of this?

Section 3 – Overall comments

9. Comparing the two different programmes, overall, which assessment method did **you** prefer? Why did you prefer that particular method?

10. Comparing the two different programmes, overall, which assessment method do you think **the trainees** preferred? What reasons or examples can you give of why you feel they preferred that particular method?

11. What other comments or suggestions would you like to make about the new training programme your trainees have been doing this year?

Dairy Cattle Mating Management

Off-Job Assessment

Learner to complete

Learner Name	
Learner Phone Number	
Learner Address	
Learner Declaration	I declare that all work is my own. Signed _____ Date _____

Assessor to complete

Result (delete one)	Standard Achieved / Further Evidence Required	
Comments/Questions to Revisit		
Assessor's Name		
Signature		Date

Re-assessment (if required) – Assessor to complete

Re-assessment Date		
Result (delete one)	Standard Achieved / Further Evidence Required	
Assessor's Signature		Date

Instructions

- Write your name, phone number and address on the front page.
- Answer all questions in the spaces provided, use more paper if required.
- All answers must be in your own words.
- You must show that you have achieved the standard for all parts of the off-job assessment for this topic. You can do this by fully completing this assessment.
- If you do not attain the standard you will have an opportunity to attempt the assessment again.
- This is an open book assessment.

Note: Make sure you also complete the data collection forms (herd/calving/mating details) in the Farm Report booklet.

Question 1

Your farm employer has given you the responsibility of being in charge of your farm's mating programme to optimise your farm's production. You are required to put together an 'ideal' plan that details relevant mating practices, optimum targets (submission, conception and non-return rates), and timeframes required before and after mating to ensure the maximum number of cows in calf and a tight calving pattern. You are to include the following in your management plan:

- All optimum mating targets and why these are important
- Timings, dates and number of weeks
- Cow health, including strategies for minimising anoestrus
- Uses of CIDRs and prostaglandin
- Feeding levels of cows
- Animal condition score
- Bull management
- Management practice you would use to support the cow's healthy pregnancy and successful calving.

Look at your Work Diary for the aspects of the mating programme you need to understand.

Write your answer to this question under the following headings:

- Targets
- Pre-mating
- Mating (AI and natural)
- After mating to first pregnancy diagnosis.

Question 2

List three key areas of record keeping that are needed to assist in mating management (before and after mating). Describe how they help farmers make decisions.

1. Recording system process: _____

What you are recording: _____

How it helps with decision-making: _____

2. Recording system process: _____

What you are recording: _____

How it helps with decision-making: _____

3. Recording system process: _____

What you are recording: _____

How it helps with decision-making: _____

Question 3

You have 600 cows which will be AI'd for six weeks. You expect that, based on past figures, approximately 68% will be pregnant when the bulls go out at the end of AI on 5 December.

You also have 150 heifers to be naturally mated. Their planned start of calving is 25 July.

Your farm employer has given you the responsibility of organising the bulls for mating.

a) How many bulls will you need and why?

i. For the cows: _____

II. For the heifers: _____

b) What date do the bulls need to go in to the heifers?

c) Describe the factors you will consider when you are selecting the bulls.

I. For the heifers: _____

II. For the cows: _____

d) What are the factors you need to consider when grazing the bulls on-farm?

e) Once the bulls are put out with the mobs, what will you look for when monitoring their performance and health to ensure the cycling cows and heifers will get in-calf? _____

f) At the end of mating, how long are the bulls retained on your farm?
