

Enhancing Readiness: an exploration of the New Zealand qualified firefighter programme

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Abstract

Volunteers significantly contribute towards the operational capability of many organisations, including New Zealand's national fire service: Fire and Emergency New Zealand. Ensuring that volunteers are trained to attend the diverse range of incidents a contemporary emergency service faces is not straightforward. Training must not only deliver the operational requirements of the role, but also address the added complexities of different adult learning styles, need for support and competing demands on the volunteer's time. To qualify for the next rank or learn a new skill-set, volunteer firefighters undertake a programme of study that typically involves a three-phased approach consisting of a pre-course distance learning phase, an in-person block course and a consolidation phase. For a volunteer to successfully complete a training programme, they need to commit a significant amount of time and energy, often calling on the support of other brigade members to achieve the programme requirements. Therefore, understanding the experiences and needs of students engaged in these training programmes is critical to ensuring that they are well supported throughout their learning journey and achieve a successful outcome.

This study explores the experiences of firefighters enrolled in the qualified firefighter (QF) programme. It examines the support mechanisms that students received during their enrolment, their engagement with the programme's e-learning component and how the programme structure and design influenced their learning journey. A qualitative descriptive methodology was used in this study. Semi-structured interviews were conducted with 13 students and four trainers involved in the QF programme. Interviews were audio recorded and transcribed verbatim, and data were thematically analysed. Key study findings centred on four key themes: the learning journey, competing demands, speed bumps and support. These themes highlighted practical and time constraints faced by the volunteers, as well as the need for additional support networks. This research exposes the large variability in the current volunteer training programme with 'success' largely influenced by personal resilience, use of independent support networks, and access to supportive learning environments. The findings of this study highlight that 1) providing support is critical to the students' learning journey, 2) certain adult education approaches are appropriate for volunteer firefighters and 3) the programme design informs the perceived credibility of the qualification. These findings

may help improve the learning environment and experiences of students enrolled in this, and other first responder training programmes.

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Glossary

E-learning	Learning and teaching that is facilitated by or supported through the appropriate use of information and communication technologies
FENZ	Fire and Emergency New Zealand The amalgamation of NZFS and over 40 rural fire agencies
First Responder	A person with specialised training who responds to the scene of an emergency to provide assistance
FF	Firefighter
NZFS	New Zealand Fire Service Provided the urban fire and emergency response within NZ
OSM	Operational Skills Maintenance
QF	Qualified Firefighter
Trainer	A person with the mandate to deliver training to firefighters
VFB	Volunteer Fire Brigade
VFF	Volunteer Firefighter
VRFF	Volunteer Rural Fire Force The rural version of a fire brigade

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Attestation of Authorship

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning."

Signed:

Date: 23rd October 2018

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My gratitude goes to Jocelyn Brace, who gave me the initial idea for this study. You gave me your time and access to your team to support the initial development of the research question and objectives. With this support, I was able to develop a deeper understanding of the context I wished to explore.

Thanks to Fire and Emergency New Zealand for providing administrative assistance to disseminate the call for participation and granting permission to conduct this study. To the participants, thank you for sharing your stories with me. I am privileged to be able to share your experiences.

To Jennifer, thank you for your support, especially in the last two months. Your awareness of my struggles and needs made the difference between success and failure.

Ethical approval for this study was granted by Auckland University of Technology Ethics Committee on 31 January 2018; approval number 18/10.

Chapter 1: Introduction

1.1 Background

Volunteer firefighters make up over 80% of Fire and Emergency New Zealand's (FENZ) operational membership (Fire and Emergency New Zealand, 2017a). These volunteers are everyday people—they come from a variety of backgrounds, such as, farmers, office workers, mothers and fathers, engineers and students amongst others. Bringing this diverse range of people together is their passion to help their community in a time of need. Volunteers often sacrifice personal, family and work time to respond to emergencies as they drop everything and answer the call for assistance. To be ready for that call, volunteers are required to attend regular training nights where they revise theory, practice skills and refresh knowledge on applicable risks (Baumann, Gohm, & Bonner, 2011). It is vital that firefighters have access to training that is fit for purpose, targeted and well supported (Childs, 2005). Volunteer firefighters also have the opportunity to attend block courses to learn new skills which may allow them to fulfil additional roles, such as performing extrications at motor vehicle accidents, rope rescues, or preparing themselves for promotion. These block courses are run during the week or over one or more weekends.


The national fire service of New Zealand emerged from humble beginnings. As early as the 1850s, individual communities established their own independent brigades to fulfil their need for some kind of fire protection. Over time, as fires got larger and more complex, changes in the firefighting landscape were inevitable. The Ballantynes fire in 1947, which cost 47 people their lives (Christchurch libraries, 2018), led to a Royal Commission recommending many improvements to the provision of firefighting services in New Zealand. One of the key outcomes of the inquiry was the enactment of the Fire Services Act 1949 (New Zealand Government, 1949). This Act detailed the duties of Urban Fire Authorities, including their responsibilities to make provision for the prevention of fires, access to land and buildings, and legislated the requirement for training and standardisation across authorities. Next, the Fire Services Act (1975) brought together individual urban brigades into one national urban fire service, signalling a move towards national consistency in equipment, policies and procedures. When the Fire and Emergency Act (2017) came into power, the national urban

and numerous rural fire organisations were amalgamated into one national service, called Fire and Emergency New Zealand (FENZ). There were already many shared practices between these separate organisations, however resources such as training, equipment, management and an increased coordination in readiness and response became realised, ensuring standardisation and efficiency.

Historically, firefighting was a male orientated domain. In the New Zealand context, the first female career firefighters were not employed until 1981 (Fire and Emergency New Zealand, 2018b). From this point, increasing numbers of female recruits have been hired as career firefighters, however women still only represent 3% of total career firefighters today (Fire and Emergency New Zealand, 2018b). In the volunteer environment, females contribute 15% of total firefighters and have been an integral part of the organisation for much longer with some brigades having female Chief Fire Officers from as early as 1993 (Fire and Emergency New Zealand, 2018b).

With the challenges of increased legislative accountability, lower frequency of significant fires (because of increased fire safety compliance and improved construction methods), and competing demands on volunteers' time, training has become a critical aspect of maintaining operational readiness. No longer can firefighters rely on "learning on the job". Volunteer firefighters have limited time to commit to operational response, regular 'skill maintenance' training and promotion courses. To counter these limitations, firefighters have been trained through a phased approach that typically involves a pre-course module completed in their own time, a practical course that tests them to a national standard, followed by a consolidation phase to confirm their knowledge. The rank structure for the urban aspect of FENZ consists of 11 levels (Table 1). Some are related to both career and volunteer firefighters, while others are exclusively assigned to one or the other.

Table 1. Ranks of the urban aspect of Fire and Emergency New Zealand

Executive Officer Ranks	National Commander	Career	
	Region Manager	Career	
	Area Manager	Career	
	Assistant Area Manager	Career	
Officer Ranks	Chief Fire Officer	Volunteer	
	Deputy Chief Fire Officer	Volunteer	
	Senior Station Officer	Volunteer/Career	
	Station Officer	Volunteer/Career	
Firefighter Ranks	Senior Firefighter	Volunteer/Career	
	Qualified Firefighter	Volunteer/Career	
	Firefighter	Volunteer/Career	

Once a person joins as a firefighter they complete the recruit programme and can subsequently respond as a crew member to incidents, under the close supervision of senior members who guide, support and mentor the firefighter. Generally, after a year or more, the firefighter can enrol in the qualified firefighter programme. They continue to progress up the rank levels depending on the brigades needs, vacancies and their qualifications. Interspaced between these rank courses are other specialist courses that firefighters may attend depending on the needs and specialisation of their brigade. Other courses include pump operation, driving, chainsaw operation, motor vehicle accident extrication and rope rescue. This assortment of training programmes requires the students enrolled in them to commit time to complete the various phases. Most of the programmes will have theoretical and practical aspects during both the pre-course and consolidation phases which require the student to conduct practical tasks during brigade training and be assessed by brigade trainers or mentors.

Recently, the qualified firefighter (QF) programme (Figure 1) adapted a different delivery model that removed the requirement of pre-course practical skills assessment, relying on the student's currency in a rotating operational skill maintenance (OSM) programme that all firefighters must maintain. An online pre-course assessment was added in lieu of the student completing a theory workbook that normally would be marked by a trainer. The online quiz generates a result instantly, informing the programme administration team of the student's achievement and compliance with the practical course pre-entry. The students complete the practical consolidation requirements on the last day of the practical course and complete a quiz online once they leave the training facility. On completion of these two consolidation requirements the student has met the programme requirements and

qualifies. They can then be promoted to the rank of Qualified Firefighter (QF), which generally happens automatically.

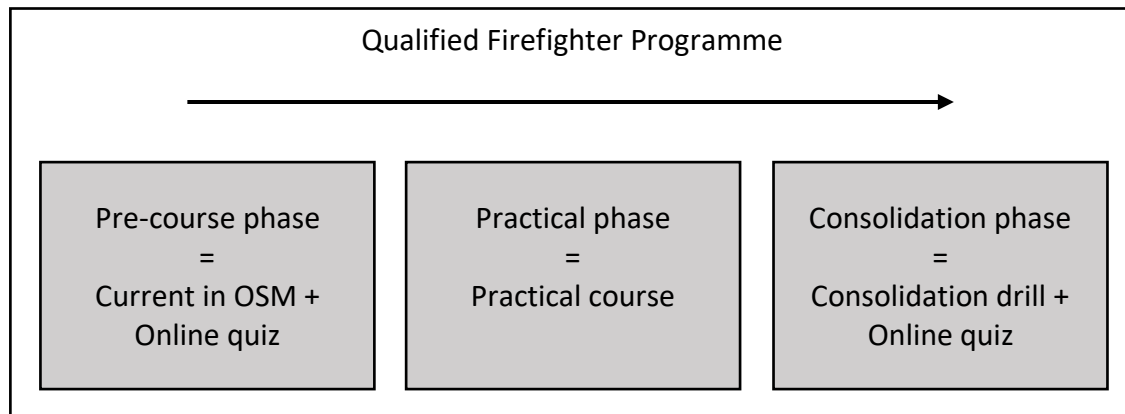


Figure 1. Qualified Firefighter Programme structure

1.2 Rationale

Organisations are adapting the way they deliver training, attempting to maintain currency in the ever-evolving world of technology. As new techniques are introduced to train volunteers, it is important to understand the students experiences so that both the content and the delivery mechanisms are appropriate. Understanding the learning experiences of volunteer firefighters is even more vital, as the ultimate aim of the training programme is to provide the student with the capacity to respond to an emergency at a moment's notice, drawing on both experiences and prior learning to make time and life critical decisions.

Existing research regarding first responder training, adult learning, and e-learning highlight some barriers and enablers to the effective training of first responders. While some commonalities may exist, they do not reflect New Zealand's social demographics, geography or environment. Nor do they take into account a single nationally operated fire service (FENZ) that is unique to New Zealand and poses its own challenges and opportunities when integrating e-learning into training delivery.

This research responds to the need for further research into adult education methods used for firefighters, the mechanisms needed to adequately support learners and the inclusion of e-learning by exploring volunteer firefighters' experiences with the qualified firefighter programme. The researcher will explore barriers and enablers to effective

participation, identify how prepared participants feel when attending practical training and how the design of the programme can support volunteerism, firefighters and Fire and Emergency New Zealand. This research may influence the continuing development and delivery of firefighter training and offer an insight to other first responder organisations both in New Zealand and abroad.

1.3 Research question and objectives

This study addresses the following research question: What are the experiences of volunteer firefighters undertaking the New Zealand qualified firefighter training programme?

The following research objectives underpin the research question:

- To explore possible enablers and barriers to effective learning for volunteer firefighters
- To explore volunteer firefighter's engagement with, and the role of, e-learning in preparing them for operational duties
- To explore the support mechanisms utilised by volunteer firefighters as they undertake the training programme and how these mechanisms could be applied to first responders engaged with distance education.

1.4 Theoretical foundation

Factors that lead to adults successfully engaging with learning can be complex and widespread. The model of 'andragogy in practice' initially developed by Knowles (1984) identified four principles that apply to adult learning. These principles were added to as Knowles further refined andragogy to the six principles presented in this study. They include 1) the learner's need to know; 2) the learner's self-concept; 3) prior experience of the learner; 4) readiness to learn; 5) orientation to learning; and 6) motivation to learn. Figure 2 shows the model as represented in the book "The Adult Learner" (Knowles, Holton III, & Swanson, 2014). Andragogy differs from other learning theories and models as it focuses on the learner's experience; specifically, the adult learner. Whilst both Kolb's experiential learning

and Mezirow's transformational learning theories were identified as being applicable to understanding adult firefighter training, andragogy goes one step further by linking with both firefighters (need to know, self-concept, and prior experience) and volunteers (readiness to learn, orientation, and motivation). As discussed further in Chapter 2, a person's desire to volunteer can vary, but whatever the reason, they have passion, drive and motivation. The volunteer firefighter typically brings a range of life experiences and are ready to learn, making andragogy an appropriate theoretical framework to guide this research.

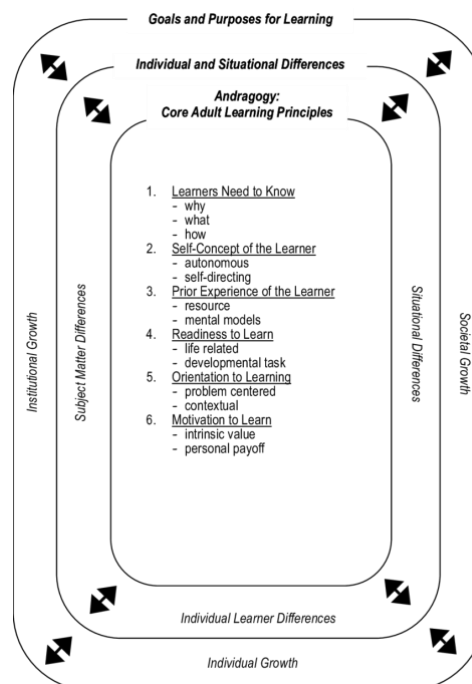


Figure 2. Andragogy in practice

1.5 Researcher background

The researcher has over 20 years' experience in firefighting with various organisations in New Zealand and abroad. In his role as a certified trainer with FENZ, the researcher delivered many block courses covering topics such as pump operation, response driving and recruit training, and also supported a cluster of volunteer brigades, providing training support and mentorship to the firefighters and brigade leadership. This close relationship provided the researcher the opportunity to gain an understanding of the experiences that students developed during their training and formed the basis of his interest in this topic.

1.6 Outline of dissertation

Chapter one has introduced firefighting in New Zealand and how volunteer and career firefighters are trained in this context. The rationale and objectives of this study have also been presented. Chapter two will critically review literature pertaining to firefighting, volunteerism, training, adult education and training delivery. Chapter three will explain the qualitative methodology and methods used in this study, outline the recruitment strategy, and detail the research rigour and ethical considerations. Chapter four will present the findings of this study and chapter five will discuss the significance of these findings related to relevant literature and offer recommendations for organisations that educate first responders. Implications to policy and practice, and the strengths and limitations of this study are also presented. Chapter six will identify areas for future research and provide concluding remarks.

Chapter 2: Literature Review

2.1 Structure and Literature Search Strategy

This literature review explores national and international literature around firefighter training with a specific focus on volunteer firefighters. Articles were sought that had a particular focus on first responders, firefighters, volunteers, adult education approaches and contemporary training delivery methods. Literature searches were conducted between November 2017 and October 2018. Journal articles were accessed via Google Scholar, search terms included, but were not limited to, firefighter, volunteer, volunteerism, training, adult education, andragogy, pedagogy, experiential learning, transformational learning, e-learning and training delivery. Articles were limited to those published in English and were screened by title and abstract to determine if the article was within the scope of this literature review. Relevant grey literature was also accessed from various New Zealand government and organisation websites, such as Fire and Emergency New Zealand and Volunteering New Zealand.

2.2 Firefighters

A Fire Service is an integral part of the emergency response community, providing a response to a wide range of emergencies outside the traditional firefighting role that historically has been the sole domain of firefighters (Fire and Emergency New Zealand, 2017a; New Zealand Government, 2017). Firefighters respond to medical emergencies, civil disturbances, natural and manmade disasters as well as hazardous substance.

Firefighting is a high-reliability role (Baumann et al., 2011) which relies on developing implicit knowledge (Denef, Ramirez, Dyrks, & Stevens, 2008) through training, response and participation with senior members 'on the job'. The modern firefighter must have a deep understanding of a wide range of increasingly complex emergencies (Holmgren, 2012). At the same time, firefighters must contend with the limitations of time and available access to training (Kobziar et al., 2009). The expectation that firefighters must be 'experts' in a diverse range of emergencies now drives operational training (Paton, 1994). Training must also meet statutory legislation obligations in an increasingly litigious society.

Firefighting is a highly stressful job with both mental and physical stressors often present at emergencies that they attend (Beaton & Murphy, 1993). These stressors are not only present at large scale disasters, but also at many routine emergencies that firefighters attend daily, including driving, firefighting and medical events. In addition to these “operational stressors”, firefighters also face the added complexity of hierarchal influences, such as the expectation to meet training standards, communicating with managers and bullying (Beaton & Murphy, 1993; Bryant & Harvey, 1996; Snook & Olsen, 2006). Branch-Smith and Pooley (2010) argue that female firefighters have an additional level of complexity when it comes to working as firefighters. While there are positive aspects, such as giving life meaning, building confidence and developing competence, there are also challenges faced relating to discrimination, not being listened to and the ‘few guy’ syndrome. The ‘few guy’ syndrome is described in Branch-Smith’s (2010) research where one or two males on a team make a female firefighter’s life difficult through behaviour that alienates or harasses them (p.16).

2.3 Volunteerism

Volunteerism is central to the “social development, economy and environment of New Zealanders” (Volunteering New Zealand, 2017, p.4). A 2008 Report ‘The New Zealand Non-profit Sector in Comparative Perspective’ states that the value of volunteerism to New Zealand can be estimated at 3.3 billion NZD (Sanders, O’Brien, Tennant, Sokolowski, & Salamon, 2008). However, the value that volunteers add to their community is far more complex than that. Volunteers add positive social change (Grossman & Furano, 1999), advocacy (Eisner, Grimm Jr, Maynard, & Washburn, 2009) and develop community capacity and resilience (Flint & Brennan, 2006). Leading into the 21st century, volunteers have expanded their capacity to respond to a more diverse range of emergencies and disasters (Hamilton, 2005) becoming more essential to their communities.

Omoto and Snyder (2002) offer a conceptual model referred to as the volunteer process model. This model consists of multiple stages and levels of analysis that highlight the complex motivators that contribute to why people volunteer. Key individual motivators identified by Omoto and Snyder (2002) are a) volunteer’s choice, b) performance, c) relationships, d) support, and e) satisfaction. This model aligns with MacNeela (2008) concept

of volunteerism, which investigates the motivations of people engaging in volunteerism. MacNeela identifies the two broad categories of 'self' and 'others', then further refines the concept into purpose, relationships, support and progression. Additional work by Omoto and Snyder (1995) identified five key motivators for volunteering, which include values, understanding, personal development, community concern and esteem enhancement. Schindler-Rainman and Lippitt (1971) propose that the decision to volunteer is made after careful consideration of the risks and rewards, both internal and external, which may affect the individual. Anderson and Moore (1978) conclude that even though motivations may differ amongst people and roles, both the desire to feel useful or needed and the humanitarian motive outweigh all other reasons given. Volunteering New Zealand (2015) suggest that to remain viable, organisations must maintain a flexible approach to volunteerism and allow volunteers to engage in varying ways and time. Flexibility in delivery models, content and support mechanisms have been suggested as options that increase volunteers' acceptance of training and therefore their continued viability as a workforce (McLennan, Birch, Cowlshaw, & Hayes, 2009; Pardess, 2005; Thompson & Bono, 1992).

2.4 Volunteer Firefighters

Of the 12,700 operational firefighters in New Zealand, more than 10,000 are volunteers (Fire and Emergency New Zealand, 2017a). Volunteer firefighters are pivotal in ensuring FENZ meets its organisational objectives (Fire and Emergency New Zealand, 2017). Volunteer firefighters do not receive a salary but 'earn' in other ways. Their compensation for volunteering can be seen as both tangible and intangible rewards and incentives (Snook & Olsen, 2006, p. 6), such as advanced training and increased social capital (Thompson & Bono, 1993).

A report commissioned by the Ministry of Internal Affairs: *Overview Paper on the State of Volunteering* (Volunteering New Zealand, 2017) identified several key themes that challenge effective volunteering and therefore, effective participation as a volunteer firefighter. They are a) the rising costs of volunteer engagement, b) time pressures, c) increased compliance requirements and d) increased travel times. The themes from this report are supported by MacNeela (2008), who investigated the challenges faced by

volunteer firefighters, concluding that the management of time between family, work and volunteering is a constant struggle faced by volunteers.

2.5 Firefighter Training

The benefits of training for firefighters may seem obvious, with firefighters developing the required technical skills to be able to render an emergency safe, but it is also the intangible skills they learn, such as communication, decision making, leadership and mental resilience, which are equally important (Crichton & Flin, 2001). Training is the first situation where new recruits learn what it is to be a firefighter and to develop character and learn the culture (McLennan et al., 2009) of an organisation steeped in history (Perkins, 1989). Several quantitative studies (Klingensmith, 2005; Landry, 2011) investigating the preferred learning styles of first responders utilised Fleming (2001) VARK questionnaire which asks participants to identify their preferred learning style from the options of visual, audible read/write, kinaesthetic and multi-modal. In both studies, the participants identified that a multi-modal approach was the most preferred option, closely followed by a kinaesthetic learning style.

Firefighters have traditionally been trained through the combination of theoretical and practical lessons on block or residential courses delivered by the fire service authority (Goodson & Murnane, 2008). Some international training delivery within the Commonwealth and America has been delegated to educational institutions after having gained certification from governing bodies, such as the National Fire Protection Association (NFPA), International Fire Service Training Association (IFSTA) and the Institute of Fire Engineers (IFE). These governing bodies employ a standards based framework that guides certified institutions, such as NFPA 1000: Standard for Fire Service Professional Qualifications Accreditation and Certification Systems and NFPA 1001: Standard for Fire Fighter Professional Qualifications (Goodson & Murnane, 2008; National Fire Protection Association, 2017a, 2017b).

Unlike many countries, New Zealand has only one national fire service called Fire and Emergency New Zealand (FENZ). Except for specialist topics, such as executive leadership, FENZ trains its own staff in all aspects of firefighting. With an estimated 12,700 operational firefighters and 624 support staff servicing New Zealand (Fire and Emergency New Zealand, 2017a) a dedicated training department delivers all training. Rank progression requires the successful completion of a series of modules. Each module presents information on a

separate topic, such as command and control, fire suppression, and hazardous chemicals. Firefighters complete these modules via distance learning prior to attending the block or residential courses in-person (New Zealand Fire Service Commission, 2016). Recently, FENZ has begun incorporating online assessments into the volunteer qualified firefighter (QF) rank to better enable asynchronous learning and allow the volunteer to engage when and where it suits them. Online learning is also being utilised in stand-alone modules with the potential of the QF programme delivery model being rolled out to other ranks.

New Zealand legislation mandates that firefighters must be trained. A firefighter acts with authority that is delegated from *The Board*. For a firefighter to be delegated authority, the delegating Board must “*be satisfied the firefighter is suitably qualified or trained to perform or exercise the function, duty, or power*” (Fire and Emergency Act 2017, s24). As training is essential to ensuring compliance with operational readiness and the legislative requirements of a fire service, and FENZ is staffed mainly (78%) by volunteers, the training of volunteers becomes a critical aspect to maintaining the organisations operational capability. How volunteers are trained must take into account their motivators, needs and be aligned with proven adult education methods (Balvin, Bornstein, & Bretherton, 2007; Knowles, 1972; Wilson, 2000). The following section identifies the motivators of adults who learn and three theories which align with the training of firefighters.

Whilst there is research into the fire related field in New Zealand, at the time of writing this dissertation, there had not been any research examining internal firefighter training. A search of reports funded by the FENZ contestable research fund identified 168 published reports. Several studies delved into volunteer sustainability and values (Alkema, Murray, & McDonald, 2013; McDermott Miller Strategies, 2011; Snively, Rae, & Zechner, 2009) and external fire safety education (Jenkins, 2013) with indirect links into the broad impact of education and training. Themes discovered include discussion outlining the training of recruitment assessors (Cerno Limited, 2003), how positive training of volunteers enhances personal growth and ones standing in the community (Kan, 2003) and the values of volunteer labour (Snively et al., 2009); however, they do not directly critique internal firefighter training.

2.6 Adult Education

Why adults engage in learning is a complex matter (Boshier, 1971). Research by Sheffield (1962) discovered that there were 58 reasons that adult participate in learning which he distilled down to five key factors that include learning orientation, desire-activity orientation, personal-goal orientation, societal-goal orientation, and need-activity orientation. These identified factors link closely the motivations to volunteer (Branch-Smith & Pooley, 2010) and the role of a firefighter (Childs, 2005). Macduff (1994) states that an adult learner needs a sense of ownership and connection with both the content and activities in training in order for it to be successful. There are many learning models and theories relating to the education of adults, however three theories that are prevalent in current literature are experiential learning, transformational learning and andragogy (Arghode, Brieger, & McLean, 2017; Knowles et al., 2014; Rahman & Hoque, 2017). These theories will be explored further next, and then linked to training volunteer first responders (Table 2).

2.6.1 Experiential Learning

Experiential learning in its most basic form is the process in which a person learns from an experience or by doing. “Experiential education first immerses learners in an experience and then encourages reflection about the experience to develop skills, or new ways of thinking” (Lewis & Williams, 1994, p. 5). Useem, Cook, and Sutton (2005) and Taber (2008) support experiential learning as a preferred method for training firefighters stating that experiences embed learning more successfully than other more theoretical based learning styles.

Experiential learning has its roots in the work of John Dewey’s concept of experience and reflective thought (Miettinen, 2000) defined as ‘experience plus reflection equals learning’ (Fowler, 2008). Dewey (1958) postulates that experience enforces critical reflection. Repeated experiences develop critical consideration of the experience based on the belief that “primitive innocence does not last” (p.323).

David Kolb is now considered to be the preeminent scholar in experiential learning theory (ELT) where he has posited his four-stage cycle of experiential learning (Figure 3) (Fowler, 2008; Vince, 1998). Kolb’s ELT model portrays two interacting modes of grasping

experience: concrete experience (CE) and abstract conceptualisation (AC), combined with two interacting modes of transforming experience: reflective observation (RO) and active experimentation (AE). D. A. Kolb (2014) states that through this learning cycle, the learner “experiences, reflects, thinks and acts” in response to the learning situation in order to make sense (A. Y. Kolb & Kolb, 2005, p. 194). Concrete experiences (CE) are the basis for reflections (RO) which are refined into abstract concepts (AC) and used as a basis to actively test (AE) and create new experiences (A. Y. Kolb & Kolb, 2012).

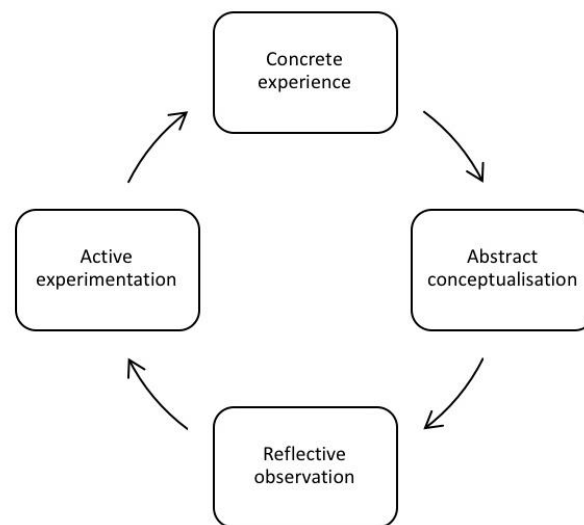


Figure 3. Kolb's Four-stage cycle of learning

Critics of Kolb's ELT argue that there are limitations to its use. Vince (1998) contends that the ELT model does not take into account the hierarchal social dynamics which privilege or disadvantage different members of society. For instance, vulnerable people or those at the bottom of a process driven, hierarchal system will have limited opportunities to experience new situations or to experiment within existing situations, therefore losing the opportunity to engage with experiential learning to its fullest capacity. He also suggests that the ELT model should not be used in situations involving health and safety issues, as experimentation in situations that involve high risk can increase the likelihood of injury or death if appropriate risk analysis and control is not undertaken throughout the experimentation process. Fenwick (2001), another critic of Kolb's model, suggests that educators can use the ELT model to significantly influence the learner's ability to conceptualise and experiment if control is incorrectly imposed in a limiting top-down manner.

2.6.2 Transformational Learning

Mezirow (1981) theory of transformational learning recognises that adults have an established set of beliefs about the world, people and themselves. These beliefs act as a set of boundaries for which new information is measured against (Mezirow, 1993). The boundaries make experiences coherent but distort perception by viewing the experience through those previously established filters (Clark, 1993).

Perspective transformation is the learning process by which adults recognise their established roles and relationships, and then take action to overcome them (Mezirow, 1993). Mezirow identifies that there are two paths to perspective transformation. The first is a sudden awareness of the assumptions which has limited their understanding of the experience, and the second is a series of smaller shifts which, step by step, allow the adult to revise individual assumptions until the very structure of the assumptions become transformed. Clark (1993) explains that transformational learning shapes people as it impacts how they perceive subsequent experiences.

Baumgartner (2001, p. 17) observes that the three phases of perspective transformation (Figure 4) start with people being faced with a “disorientating dilemma” where they are confronted with an issue they are unequipped to process with their existing experiences. They then enter the second phase, which is “critical reflection” where they re-evaluate their existing assumptions about themselves and the world. Thirdly, people participate in “reflective discourse”, discussing and reflecting on their new perspectives.

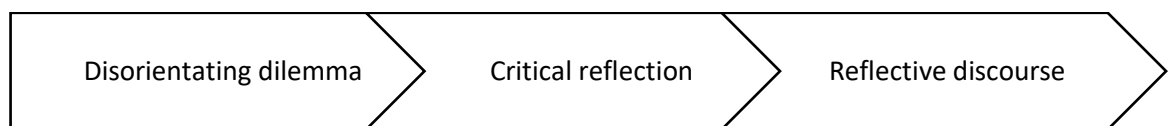


Figure 4. Mezirow's model of Transformational Learning

Pietrykowski (1996) is critical of Mezirow's model of transformational learning, arguing that seldom is there a situation that can be free of distortion from socio-cultural contextualisation. Depending on the influence of the power relationships a learner may or

may not be able to overcome this form of control to be able to successfully navigate the three phases (McDonald, Cervero, & Courtenay, 1999).

2.6.3 Andragogy

Andragogy is the art and science of helping adults learn (Merriam, 2001) which originates from the work of Knapp, Rosenstock and Linderman prior to being popularised in the early 1970's by Knowles (Knowles, Holton III, & Swanson, 2014) in an attempt to focus on the learner and differentiate from the theory of pedagogy, which is the science of educating children and is educator focused (Knowles et al., 2014). Andragogy centres on the adult learners needs, experiences and motivators to learn and is based on six assumptions (Figure 5). The first assumption 'the need to know'; Knowles (2014) states that adult learners need to know what the benefits of learning or negative consequences of not learning something are, before engaging in it. The second assumption 'self-concept' refers to the idea that the adult learner has a concept of being responsible for their own decisions. Knowles (2014) contrasts the subconscious need of an adult to be self-directing versus the learning experiences that would have been typical during their youth (i.e., a teacher-led environment), which can elicit a 'teach me' attitude and create a subconscious barrier to learn if not countered. The third assumption 'prior experiences' infers that adults inherently come into a learning environment with a range of experiences that can be directly or indirectly applied to the setting. Knowles (2014) acknowledges that with prior experience comes the challenge for an educator to tailor their delivery to meet the diverse needs of the students. The fourth assumption 'readiness to learn', Knowles (2014) ties an adult's readiness to learn with their perception of their need to learn. If there exists a developmental need to increase knowledge, then the adult learner will more readily embrace the learning experience. The fifth assumption 'orientation to learning'; Knowles (2014) argues that adults are task or problem focused and therefore motivated to learn relative to the problems or tasks they are faced with. The sixth assumption 'motivation' states that adults are motivated by both external and internal pressures to learn. Externally, they can be motivated by such things as increased salary and promotions whereas internally they could be motivated by things such as increased self-esteem and quality of life (Knowles et al., 2014, p. 47).

Merriam (2001) emphasises that andragogy's biggest impact is as a guide to practice, stating that many adult educators will take their first look into the world of adult education through the principles of andragogy however the field needs to be prepared to move beyond andragogy.

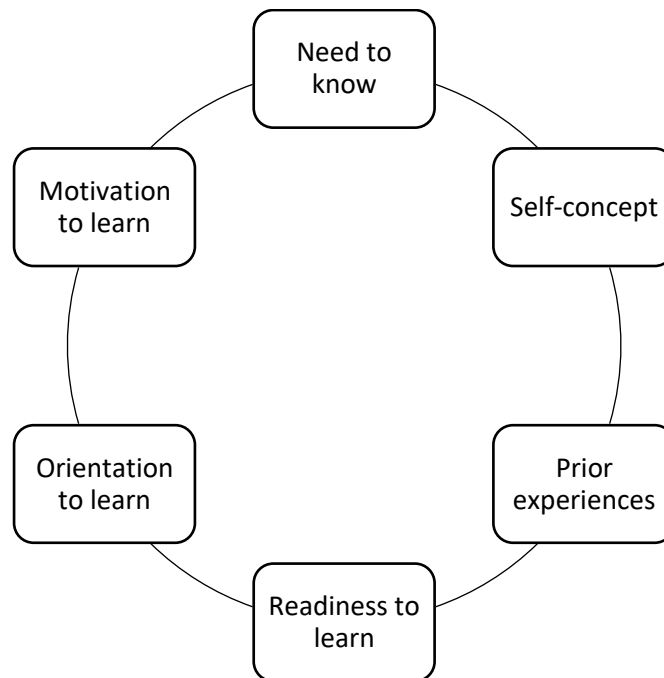


Figure 5. Knowles' six principles of andragogy

Hartree (1984) heavily critiques andragogy as a subjective approach to interpreting the needs of learners. She questions Knowles statement of adult learners being self-directing, as she states that they may neither be self-directing nor want to be. Hartree (1984) further explains that andragogy is not robust enough to be utilised universally in various locations or situations and questions whether it is a theory of learning or of teaching as Knowles appears to confuse the issue in his writing.

Table 2 provides a summary of the three theories of adult learning and how they relate to the training of firefighters. The literature exploring these methods highlight factors important to training adult learners who volunteer as first responders.

Table 2. Application of education methods to training first responders

Education Method	Key Points	Applicability to first responders
Experiential Learning	Hands on experiences	Would cater to first responders who are kinaesthetic learners
	Enables reflection	Enables the application of experiencing operational situations to the learning environment
	May limit subordinate members	Emergency services are typically hierarchal in their organisational structure, so this may limit input from subordinate members
	Should not be used in risky environments	Responding to emergencies is inherently risky
	Educators can influence ability to use ELT	The trainers' understanding of ELT, their confidence and operational experience will provide the scope to operate. Trainers with more experience and understanding of policies, procedures and ELT would provide greater scope for students to experiment
Transformational Learning	Acknowledges existing beliefs and boundaries	Volunteer firefighters come from diverse backgrounds and experiences
	Overcomes identified boundaries, roles and relationships	May have to challenge roles and relationships in a hierarchal organisation, which may cause tension
	Influenced by power	Hierarchal power influences prevalent in the emergency services can limit transformational learning
	Strength of boundaries influence the ability to transform	The more regimental the training environment is, the less transformational it can be
Andragogy	Learner needs to know why	Knowing why will allow the first responder to extrapolate knowledge to varying situations
	Supports learner's previous experiences	First responders come from a variety of backgrounds that lend a unique lens to their situation
	Self-knowing and directed	Knowledge of position exists but self-direction may not apply to all situations
	Problem centred learning	Emergency services primarily respond to problems (emergencies), so suits this field
	Not universally applicable	Applicable to practical based learning of first responders

2.7 Training Delivery for First Responders

The way in which training is delivered can influence its success (Knowles et al., 2014), however the preferred delivery method can vary depending on the topic and setting (Fox, Hebert, Martin, & Bairnsfather, 2009). Historically, first responders have learnt by either completing bookwork, attending practical sessions, or a combination of both (Baumann et al., 2011). The widespread adoption of e-learning has provided an additional avenue to educate first responders that could better support their unique field of work.

2.7.1 E-learning

The New Zealand Ministry of Education (2017) defines e-learning as “learning and teaching that is facilitated by or supported through the appropriate use of information and communication technologies (ICTs)”. Nichols (2003) further narrows this definition by stating that “e-learning is the use of various technological tools that are either Web-based, Web-distributed or Web-capable for the purposes of education”. Some scholars (Keegan, 2002; Taber, 2008; Tyler-Smith, 2006) agree that the purpose of e-learning is to enable accessible, relevant and high-quality learning opportunities via the use of ICTs to improve student engagement and achievement. Various terms are used interchangeably with e-learning, such as web-based-training, (Jerin & Rea, 2005), computer aided instruction (Williams et al., 2011) or asynchronous online learning (Maxfield, 2009).

The history of e-learning has its roots in the early nineteenth century. The industrial revolution created many innovations that supported distance education, such as the implementation of postal and rail networks. These innovations allowed for the distribution of educational material and provided the first mainstream platform for learning via correspondence (Keegan, 2002). E-learning as a development of distance education can be traced back to the 1960s (Nicholson, 2007); however at this time, technology restricted the scope and application of this emerging field to the military and higher education research (Nicholson, 2007). The development of the World Wide Web in the 1990s provided a platform for the exponential growth of e-learning (Garrison, 2011). E-learning integrated independence with connectivity, overcoming the traditional constraints of time and space

(Garrison, 2011). Bernard et al. (2004, p. 380) described e-learning as a method that supports “anytime, anyplace” delivery and increased “flexibility, interactivity, access and delivery”.

Some scholars (Muirhead, 2007; Pelletier, 2005) argue that e-learning correlates closer with pedagogy rather than andragogy in that the e-learning student has limited control over the environment, is developed top-down, and is prescriptive. Meanwhile other researchers (Maxfield, 2009; Rossman, 2000) suggest that the attributes of e-learning and andragogy are similar. E-learning supports self-direction, encourages the learner to draw on experiences, and many aspects of e-learning require a problem-centred orientation to learning.

Despite e-learning being an ideal method of asynchronous learning, a number of challenges are faced. Traditional adult learners can struggle with contemporary digital literacy (Netsafe, 2016), attrition rates can increase when compared to classroom learning (Hollow, 2013) and the capacity to adapt cognitive loading across multiple learning curves can be a contributing factor to reduced engagement and understanding (Tyler-Smith, 2006).

2.7.2 E-learning and First Responders

E-learning has been utilised to train first responders more frequently over the last decade with further innovations allowing for a variety of topics to be delivered through this medium. Jerin & Rea’s (2005) research supports the integration of e-learning in continuing training programmes for paramedics. Their research has found that the greater flexibility and added support of digital video, audio and imagery has high acceptance amongst students. Holmgren (2014) discovered that some firefighter students who participated in e-learning were more knowledgeable and better prepared for practical courses.

The asynchronistic nature of e-learning is a benefit to counter time-bound challenges (Holmgren (2014). Maxfield (2009) concluded that asynchronous online learning has great potential to be important and effective for firefighter training. Merrill, Di Silvestro, & Young (as cited in Maxfield, 2009) and Williams et al. (2011) found that e-learning fosters reflective learning and critical thinking — two important attributes that can support decision making for firefighters at incidents (Baumann et al., 2011; Childs, 2005).

However, other research found that e-learning challenged existing ideas about first responder training for both students and instructors. Holmgren (2014) found that instructors

and students of practically based rescue courses preferred on-campus education over on-line modules as the training is grounded in the instructors' knowledge and experience. He also found that there was widespread distrust in the concept of teaching firefighters at a distance. Maxfield (2009) discovered that firefighters undertaking online education were frustrated with the lack of instructor engagement. He argued that the student-to-student communication that is critical to learning was non-existent (Maxfield, 2009).

Wilkerson, Avstreich, Gruppen, Beier, and Woolliscroft (2008) and Tate, Sibert, and King (1997) have investigated the application of simulation and virtual reality (VR) training as an additional method of using technology to train firefighters in high-risk, resource intensive scenarios. Wilkerson et al. (2008) identified that simulation training has the ability to provide participants access to otherwise unavailable locations to conduct virtual training, increasing their knowledge and experience without exposing them to danger. Immersive VR training is a powerful tool to train firefighters for "high acuity, low frequency" events and is an expansion to the e-learning environment (Wilkerson et al., 2008).

Leading scholars (Maxfield, 2009; Holmgren, 2014; Jerin & Rea's, 2005) state further research is required into the use of e-learning with first responders. Themes that require further investigation include identifying the barriers and enablers that may impede or otherwise assist in successful integration of e-learning, how effective use of e-learning can create a better prepared student and how issues of access and user interfaces can be overcome.

2.8 Concluding comments of literature review

This literature review has analysed a range of literature related to volunteer firefighters and the different educational approaches applicable to their training. The literature indicates that firefighting is a high reliability role which requires staff to have a deep understanding of a wide range of increasingly complex emergencies. Several factors impact the volunteer firefighter's ability to meet these expectations such as their availability of time, increased compliance requirements, and increasing costs of volunteer engagement. Suggestions made by Volunteering New Zealand (2015) to counter some of these factors include increased flexibility in training and the availability of support mechanisms.

A number of reasons why adults decide to engage in education were identified in existing literature. These motivators align closely with the motivations of volunteers such as esteem enhancement, personal development and societal-goal orientation. Understanding the drivers of adult learners and volunteers can assist in adapting to educational approaches which are orientated towards volunteer firefighters. This literature review identified three adult educational approaches that correspond with the identified needs of volunteer firefighters: experiential learning, transformational learning and andragogy. Whilst the literature identified critiques of all three approaches, aspects of each can be applied to the learning needs of volunteers. The existing literature also identified how e-learning supported the training of volunteers by enabling automation and supporting asynchronous learning, thereby helping to overcome the challenges of time and place.

This literature review suggests that more is expected from volunteers than ever before and that identifying appropriate training delivery methods is essential in meeting the expectations of volunteers whilst navigating the challenges of time, family and work. Little is known about the specific challenges that New Zealand volunteer firefighters face when engaging in education, including the influence of the social and cultural factors present in volunteer brigades. The study that follows will contribute to the identified gaps in the literature.

Chapter 3: Methodology

This chapter outlines the methodology, study population and methods of data collection and analysis utilised in this study. The study employed a qualitative descriptive approach guided by the interpretive paradigm. Section 3.3 provides a rationale for the selection of the study population, sampling strategy and the recruitment process followed. The following section (3.4) explains why semi-structured interviews were used as the data collection method. Section 3.5 describes how thematic analysis was used to analyse the data. Lastly trustworthiness (3.6) and ethical considerations (3.7) are explained.

3.1 Research Paradigm

As a researcher, I subscribe to the interpretive paradigm. The interpretive paradigm allows a researcher to view the world “through the perceptions and experiences of the participants” (Thanh & Thanh, 2015, p. 24) which is critical to the study being undertaken. Exploring the experiences of the participants requires the researcher to understand that multiple worldviews exist and are equally valid (Ponterotto, 2005). Mack (2010) argues that the ontological assumptions of interpretivism are that people will interpret an experience differently, providing multiple perspectives of an event. In order to understand the experiences of firefighters, their learning and the application of that learning, it is important to give the participants’ voice meaning.

3.2 Methodology

The methodology chosen for this study was qualitative descriptive (QD). The aim of this research is to capture the experiences of firefighters engaged the qualified firefighter training programme and provide a comprehensive summary of the meanings that participants attributed to those experiences. Qualitative research is well suited for "why", "how" and "what" questions about human behaviour, motives, views and barriers (Sandelowski, 2000). A QD study is a comprehensive summarisation of events experienced by individuals or groups of individuals and is drawn from naturalistic enquiry (Lambert & Lambert, 2012). Neergaard, Olesen, Andersen, and Sondergaard (2009) describe that a QD method should be used when

a description of a phenomenon is desired. QD research is valuable as it can help focus on the experiences of the participants (Lambert & Lambert, 2012; Neergaard et al., 2009). QD stays closer to the data than other qualitative methodologies, but still has some level of interpretive analysis (Lambert & Lambert, 2012; Neergaard et al., 2009).

3.3 Study area and population

In seeking a group of firefighters that were able to give a full and rich voice to the phenomenon of firefighter eLearning, the recruitment process was restricted to a specific rank bracket within the urban portion of the national firefighting organisation, Fire and Emergency New Zealand (FENZ). The rank bracket must have enough organisational knowledge and an understanding of a variety of educational techniques to be able to contrast and reflect on their learning experiences. By selecting the qualified firefighter (QF) rank (2nd of 3 non-officer ranks), participants would have typically completed at least two years' service in their brigade and attended a variety of courses with a mixture of bookwork, eLearning and practical coursework. Additionally, the QF rank was the group of firefighters that have been exposed to the largest variety of eLearning and eAssessment, having engaged with several modules of brigade-based learning as well as the QF online assessment process. As outlined in the introduction chapter, FENZ is a newly created organisation which brings together one urban fire and many rural fire organisations. As the urban portion of FENZ has had more opportunity to interact with the existing training and eLearning programmes, participants were only drawn from this group.

This study was conducted in New Zealand and drew participants from students and trainers involved in the QF programme. By selecting students and trainers, important perspectives from both the learner and the instructor were gathered. The students were able to reflect on the experience of completing the learning and assessment components in the QF programme, the support they received from their brigade and the wider organisation and how prepared they felt when attending the practical course after having completed the pre-course learning. The trainers were able to reflect on the students' preparedness for the practical course, after having completed the online assessment process, which formed part of the entrance criteria for the practical component.

3.3.1 Sampling

Purposeful sampling (Coyne, 1997) was undertaken to recruit students and trainers who met the inclusion criteria. Students who were over the age of 18, an urban volunteer firefighter and enrolled in the QF programme having completed the online assessment were included in the initial call for participants. Trainers who were over 18 and had participated in the delivery of the QF practical course were included for the selection criteria for the Trainer participant category. Potential participants of both categories who were located in the North Island were preferentially selected due to logistical constraints.

3.3.2 Recruitment

The National Firefighter Programme Manager was initially approached in person to discuss strategies that would allow students to self-identify and voluntarily participate in this study. Potential student participants were provided the participant information sheet (PIS) via email, which was sent to them by the FENZ administration team leader, thereby maintaining their anonymity. Students then self-identified and contacted the researcher directly to express their interest in participating. From those that indicated interest, purposeful maximum variation sampling (Etikan, Musa, & Alkassim, 2016; Sandelowski, 1995) was utilised to ensure a diversity of gender, location and role until data saturation was achieved (Mason, 2010). Trainers were approached via the researcher's existing networks. These recruitment methods minimised potential conflicts of interest due to the researcher's position in FENZ as an operational firefighter who is also involved in the delivery of training.

3.4 Data collection

In-person, semi-structured interviews with open-ended questions were utilised as the method of data collection for this dissertation, which aligns with the design of QD research (Lambert & Lambert, 2012). Semi-structured interviews provided a flexible tool to capture people's voices and the way they interpret their experiences (Rabionet, 2011).

3.4.1 Interviews

To fulfil the aim of the research, developing the interview questions was important. The questions were initially designed in three broad categories covering: 1) access to the online component of the QF programme, 2) experiences with learning the material and the applicability of the online assessment in relation to the theory covered, and 3) application of the theory learnt to practice. In developing the questions, it was important to allow the participant a chance to reflect on different aspects of the learning environment and relate it to their perceptions of what it meant to be a firefighter and how the learning prepared them for practical training and operations. The questions were trialled with both a QF student and a trainer that led to the refinement of the questions to further explore the participants' perceptions and views of the research area. Feedback from the pilot interviews led to the development of questions surrounding the participant's learning style, the support they received while undertaking the learning module, and exploring perceptions of credibility after having finished the QF programme. Prior to conducting the interview, participants were given the opportunity to read the PIS and ask any questions they may have before signing the consent form. The interviews were conducted primarily in a quiet public café or park, lasted between 35 and 60 minutes and occurred between March and June 2018. By setting the interview in a mutually agreeable space that was not their fire station, the participant was able to freely express themselves, explore their experiences and respond to the researcher's questions.

3.5 Data analysis

Interviews were audio-recorded with the participant's permission and subsequently transcribed verbatim into electronic format. During this process the researcher was able to become more familiar with the data. Once the data was transcribed, an inductive thematic analysis (Braun & Clarke, 2006) process was used to identify themes and sub-themes within the collected data. A combination of both manual theme identification and NVivo® software was used to manage the data and themes.

3.5.1 Thematic analysis

Braun and Clarke's (2006, 2013) thematic analysis was utilised as the qualitative analytic method to code and analyse the data. The six phases of thematic analysis consist of familiarisation with the data, coding the data, searching for and identifying themes, reviewing the themes, naming them and then writing up. This provided the researcher with a flexible approach (Clarke & Braun, 2013) to bring meaning to the participants' experiences. Patterns were identified (Aronson, 1995) and categorised into themes and sub-themes. Themes that emerged from the participants' stories were then "pieced together to form a comprehensive picture of the participants collective experience" (Aronson, 1995, p. 2). Key themes were identified with their relationship to the research question (Braun & Clarke, 2006).

The first step was for the researcher to become familiar with the collected data (Braun & Clarke, 2006). Familiarisation with the data was achieved by listening to the recorded interviews multiple times which gave the researcher an opportunity to understand the participants' stories. Further familiarisation occurred through the transcription of the interviews. Familiarisation and transcription of each interview occurred shortly after they were conducted, allowing for refinement of the interview questions relative to emerging themes.

Coding is a process which assigns labels with "symbolic meaning to chunks of data" (Miles, Huberman, & Saldana, 2013, p. 71). The researcher conducted initial coding manually by reading the transcripts and taking notes in the margin, identifying chunks of meaningful information. Qualitative data analysis software, NVivo®, was then used to manage the coded chunks and group them into initial themes and subthemes.

The search for themes occurred throughout the manual coding process with the researcher annotating ideas in his journal. The journal provided the researcher an opportunity to reflect (Lincoln & Guba, 1986) on emerging themes which were then inserted into mind-mapping software Simplemind®. The mind-map representation provided the researcher with an opportunity to visualise emerging themes and draw relationships between them. Data was then coded in NVivo® using the identified themes and sub-themes.

Once initial coding was completed, the researcher reviewed and recoded the data to better represent the participants' stories and experiences. The researcher did this by

reviewing the codes and assessing their fit to the emerging themes. Themes and sub-themes were created, dissolved, altered and merged until a suitable representation of the participant's experiences were finalised. Four key themes were identified through the analysis process, they were 1) the learning journey; 2) competing demands; 3) speed bumps; and 4) support. The results of the data analysis were written up in Chapter 4 with quotes from participant interviews to support the identified themes.

3.6 Trustworthiness

Research rigor was confirmed by aligning with Lincoln and Guba (1986) trustworthiness construct, which is comprised of four key components: credibility, transferability, dependability and confirmability.

3.6.1 Credibility

Credibility is establishing the "confidence in the truth" of the research (Guba, 1981, p. 79) and aligns with the internal validity of a positivist paradigm (Lincoln & Guba, 1986). Credibility was demonstrated in this study by using well-established research methods, iterative questioning, peer debriefing, member checking, prolonged engagement and the researcher's experience.

Shenton (2004) states that a key aspect to ensuring credibility is the use of well-established research methods. QD research has been proven as a credible methodology when the researcher's intent is to describe the participants experiences (Lambert & Lambert, 2012; Neergaard et al., 2009; Sandelowski, 2000). Iterative questioning (Shenton, 2004) was employed by the researcher to clarify and confirm the participants responses. This process was supported by the semi-structured questioning technique utilised in this study and allowed the researcher to burrow into the truth of the participants' responses. To do this, the researcher varied subsequent questions, probing from a variety of angles or coming back to a previously discussed topic once a supporting question was answered. Peer debriefing was regularly conducted during the study between the researcher and his supervisor to discuss the themes and sub-themes (Lincoln & Guba, 1986).

Member checking (Lincoln & Guba, 1986) was conducted by sharing the themes and sub-themes that were identified from the data with the participants, ensuring that the researcher accurately represented their views, opinions and experiences. Feedback from the member checking supported the identified themes and their descriptors so no further alterations were required. Prolonged engagement is the “lengthy and intensive contact with the phenomena” (Lincoln & Guba, 1986, p. 77) which the researcher achieved due to his position within the organisation and experience in the firefighting field. The researcher has been involved in firefighting both in New Zealand and abroad for more than 20 years. In this time, the researcher has worked in urban, rural, and military firefighting environments, responding to a variety of complex emergencies and natural hazard events. In these roles, the researcher has developed significant experience in the development and delivery of training across all facets of comprehensive emergency management to firefighters and allied agencies, both volunteer and paid. It is from this background that the researcher is well suited to understanding the complex themes that the participants identified through the data collection.

3.6.2 Transferability

Transferability is the demonstration of external validity and the application of a study’s findings to a wider population (Shenton, 2004) and can be achieved through purposeful sampling and providing a thick description of the phenomena. Purposeful maximum variation sampling (Coyne, 1997; Sandelowski, 1995) was used in this study. The researcher selected participants who came from a range of locations and ensured that a mixture of both male and female participants were included. Participant recruitment continued until a representative sample across a range of demographic indicators were met to ensure a diverse sample was achieved. Even though FENZ is a unique organisation, the applicability of this research to the wider emergency response community is valid (Shenton, 2004). The themes and findings may be applied across other first responder and volunteer organisations in New Zealand and further abroad. A thick description is provided in the study so that an appraisal can be made by other researchers about the transferability of the findings to other contexts (Lincoln & Guba, 1986; Shenton, 2004).

3.6.3 Dependability

Dependability focuses on the reliability of the study and is closely related to credibility (Lincoln & Guba, 1986; Shenton, 2004). Dependability was addressed by external audit (Guba, 1981). The researcher maintained an audit trail by keeping all documentation and recordings securely as described in the ethics section of this chapter. Ongoing auditing was also conducted by the researcher's supervisor throughout the study to ensure the accuracy of the study.

3.6.4 Confirmability

Confirmability addresses the objectivity of the study being undertaken (Lincoln & Guba, 1986). Reflexivity is the researcher's ability to critically self-reflect and "explore the ethical entanglements" (Kleinsasser, 2000, p. 157) posed by the research. The researcher kept a journal, which allowed him to record experiences, challenges and opportunities as they were discovered and served as a basis for reflection throughout the study. The design of this study recognised that the researcher's position within FENZ may lead towards some level of bias or subjectivity (Lincoln, 1995; Shenton, 2004). To counter this predisposition, the researcher was aware of his biases and member checking was done by returning the themes, sub-themes and their descriptions to the participants for feedback.

3.7 Ethical Considerations

Ethical approval (Appendix A) was granted by the Auckland University of Technology Ethics Committee (AUTEC) on the 31 Jan 18 (AUTEC Reference number 18/10). Approval for site access (Appendix B) was gained from Fire and Emergency NZ leadership and the Senior Research Advisor prior to commencing the research. Participants were informed about the study through Participant Information Sheets that outlined the benefits and minimal risks that the research presented. As the researcher is employed as a FENZ Trainer, a conflict of interest was acknowledged. To minimise this conflict of interest, the following measures were taken: 1) approval was sought from the FENZ Education Services Manager (Appendix F); 2) the researcher does not instruct on the volunteer QF programme, thereby ensuring that the participants did not perceive a risk to their progression; 3) participants were informed that

their participation was voluntary and their decision to participate would not influence their employment or relationship with FENZ; 4) all collected data would remain confidential to this project; 5) during the interviews, the researcher did not wear ranked uniform thus removing perceptions of authority.

Participants were given the opportunity to ask questions about the study prior to signing the Consent Form. Participants were also able to withdraw from the study without question, and without negative implications to their employment or service to FENZ. Confidentiality was maintained in all reporting of this research to protect participants' identities through use of pseudonyms and removal of all identifying information.

Chapter 4: Results

This chapter provides the demographics of the participants and the results of the study. Themes and sub-themes that arose from the thematic analysis of the data are explained and supported by participants' quotes.

4.1 Demographic characteristics of study participants

The initial request for participation elicited expressions of interest from 27 students and four trainers within the Qualified Firefighter (QF) training programme. Once the Participant Information Sheet (PIS) was distributed, eight students did not respond within the required timeframe to be included in the study and two declined to participate. All four interested trainers agreed to participate with the study. The national demographics of Fire and Emergency as reported in the 2017 Annual Report (Fire and Emergency New Zealand, 2017b) are presented in Table 3 and the participant characteristics (both students and trainers) are presented in Table 4. Participants ranged in age (27 – 65 years old), the student average age was 40 compared to the FENZ average age for volunteers of 43.5; service length (2 – 13 years); ethnicity (NZ European: 8, Māori: 3, European: 3, Other: 3), due to the high percentage of "ethnicity not recorded" in the Annual Report, it is not possible to compare the ethnicity of the participants with FENZ; and brigade location (metro: 3, non-metro: 10). Regarding gender, there were 4 females and 13 males representing 24% and 76% of the participants, respectively, compared to the national FENZ volunteer ratio of 16% female and 84% male (Fire and Emergency New Zealand, 2017b).

Table 3: Demographics of Fire and Emergency New Zealand

Category	Career (%)	Volunteer (%)
Average age	45.7	43.5
Ethnicity		
NZ European (including Pakeha)	70.6	48.9
Māori	11.2	5.1
Pacific Peoples	4.4	0.6
Asian	0.1	0.3
Ethnicity not recorded	13.7	45.1
Gender		
Male	96.5	84.1
Female	3.5	15.9

(Fire and Emergency New Zealand, 2017b)

The student participants' occupational background varied with two of the three in the farming sector being managers and those categorised as engineers were a mixture of electrical, computer and, mechanical engineering graduates.

4.2 Key themes and sub-themes

The data was thematically analysed, producing four key themes and 13 sub-themes that explored the experiences that the participants had when engaging in the QF programme, either from the perspective of the student or the trainer. These themes relate to student's motivation to engage with the programme, the challenges they faced when undertaking the programme, the learning support they received, their adaptation to the learning environment and the integration of online training tools. Responses from trainers provided further depth to the student's experiences, rationalising the identified themes. The four key themes identified were: 1) the learning journey; 2) competing demands; 3) speed bumps; and 4) support.

Table 4: Demographic characteristics of study participants (n=17)

Category	N (%)
Role	
Trainer	4 (24)
Student	13 (76)
Participant's age	
20-29	1 (6)
30-39	8 (46)
40-49	6 (36)
50-59	1 (6)
60-69	1 (6)
Ethnicity	
NZ European (including Pakeha)	8 (46)
Māori	3 (18)
European	3 (18)
Other	3 (18)
Gender	
Male	13 (76)
Female	4 (24)
Employment Field	
Engineering	4 (24)
Administration	3 (18)
Farming	3 (18)
First Responder	5 (30)
Management	1 (6)
Student	1 (6)
Length of Service	
(Students)	
≤ 3	2 (12)
4-5	6 (36)
6-7	3 (18)
8 ≥	2 (12)
(Trainers)	
≤ 6	2 (12)
7 ≥	2 (12)
Region Living In	
Northland	1 (6)
Auckland	8 (46)
Waikato	3 (18)
Bay of Plenty	2 (12)
Hawkes Bay	1 (6)
Manawatu - Whanganui	2 (12)
Brigade Type (students only)	
Metropolitan*	3 (23)
Non-Metropolitan	10 (77)

*Metropolitan Brigades have heightened risk profiles and interact with Career Firefighters more frequently

The themes and sub-themes are described below with supporting quotes from participants to provide additional context to the themes. Table 5 provides a summary of the themes and sub-themes.

Table 5: Themes and sub-themes

Theme and sub-themes	Description
The Learning Journey	The learning journey that the firefighter takes to reach the next rank. Their motivation and the discovery of their preferred learning style. Adapting to a new learning approach.
Drivers to learn	The factors that motivates the volunteer firefighter to engage in the learning programme
Learning styles	The preferred learning style of the student
Comprehensive range of knowledge	The need for the contemporary volunteer firefighter to broaden their learning capacity to cover a wide range of topics The student's preparation for the practical course
Realising potential	Developing as a firefighter and as a person
Measuring success	Questioning the suitability of the online assessment tool to accurately measure students' knowledge
Competing Demands	As a volunteer firefighter, the learner has competing demands on their time and resources, creating a need to be efficient and resourceful.
Time is precious	Mentor's availability impacted the flow of student learning The student's application of asynchronous learning
Family impact	The support and challenges that family places on the learner trying to learn
Speed Bumps	Hurdles faced by the volunteer firefighter when seeking to develop themselves through the qualified firefighter programme.
Am I ready yet?	Deciding when one is ready to enrol in the programme

Credibility	The perceptions of credibility of the brigade after a volunteer firefighter completes the programme
Accessibility	The experiences of accessing the online assessment from multiple locations and devices
Online frustrations	The design and interactivity of the online assessment
Support	Support networks that the firefighter utilised or discovered while engaging with the learning programme.
People supporting the learning	The suitability of training mentors; firefighters self-initiating learning groups with brigade peers
Forging ahead alone	Seeking, but not receiving needed support

4.2.1 Theme 1: The learning journey

Students described the journey they took through the QF programme and what motivated them to engage in it. They explained their need to adapt to their first experience with online learning, the requirement to be more autonomous with the learning process and how their learning style was supported. Participants were exposed to new experiences and realised their developing potential as their skills and knowledge matured. Participants witnessed varying levels of success and how success is measured before, during and after the practical phase of the programme.

4.2.1.1 Drivers to learn

Students discussed their motivations for enrolling in the QF programme. Some saw the QF programme as an opportunity for self-development and a mechanism to obtain the next rank, which included extra responsibilities and respect within their brigade. Participant 4 (student) contrasted the way a qualified firefighter is treated compared to a rookie by saying that “I’m no longer being micro-managed at calls now I am a QF”. Participant 9 (student) had a desire to continue learning after completing the recruit programme so decided that enrolling in the QF programme was the best way to achieve this.

That’s why I self-enrolled because it’s something I really wanted to do for myself and my self-development and I don’t want to be held back by other people’s choices. (Participant 9, student)

Others felt a sense of duty. They acknowledged the wider needs of having appropriately qualified staff in their brigade and the long-term succession planning required to safe-guard the future stability of their brigade. They also displayed an understanding of service and the responsibility they felt in ensuring that appropriately qualified staff are available to provide a response to the community.

I had to do the QFF study because we would run out of qualified people. (Participant 12, student)

It’s that story of you being a basic firefighter moving to the next step. It was good to start learning more. Things like that were good. We need more qualified people (Participant 13, student)

4.2.1.2 Learning styles

Students described their preferred learning styles and what worked well for them. The students explained that there was no practical aspect to the pre-course phase of the programme, meaning that if they chose, they could complete the online assessment and “wing the rest” (Participant 1, student) until the practical course. Some students discovered that the theoretical study they undertook was not sufficient to solidify the new knowledge. They felt the need to rehearse the skills practically during brigade training nights as they were predominately kinaesthetic learners. Participant 2 (student) contrasted the QF programme with the practically focused recruit programme, which required the student to demonstrate practical skills repeatedly and then have these signed off by a training mentor.

As I've said, I'm a kinaesthetic learner, I like the brick system, here's something you got to do, run through it with a trainer, practice it a few times, have them watch you do it, and once they are satisfied, go yes you have that skill. (Participant 2, student)

You know when you do your recruit course, you learn something then go and fill in that you've done this, you've learnt it, you've studied it and you've done it with your hands, and here, you learn it, but you haven't done it with your hands. (Participant 5, student)

Others found that keeping a notebook or journal would allow them to reflect on their learning and contrast the theory to the practical. They found that they could return to it as a mechanism of evidence when having to contextualise a learning objective. Participant 9 went further, using their journal to link operational experiences to past and future learning.

My learning journal works quite well, like when you come out of a call and there was something you weren't quite sure about, it gives you something to refer back to, to think, this was relevant and go back through it. (Participant 9, student)

Yes, I took notes, all the time, just here I have a notepad, I wrote down everything I really wanted to know. Its good. (Participant 10, student)

4.2.1.3 Comprehensive range of knowledge

Participants found that they were expected to have a deeper level of knowledge on a wider range of topics than previously expected. Despite these expectations, they struggled to develop and retain the knowledge after completing the online assessment. Students also found that the knowledge they required was at times unknown by senior members of their brigade, so they could not obtain the needed support.

That's a long time to have a grasp on learning and I know – we have guys who are heading away on the QF course shortly, and they are experiencing this too, they are saying "it's been so long since we did that quiz that I can't even remember the answer". (Participant 1, student)

There were still a few things. For example, not every station has the same type of equipment. There were things that I have never seen before, like a gas detector. Definitely, I have never seen or used a gas detector. (Participant 6, student)

Some participants found that they were looked at as a source of new knowledge that can be used to inform the entire brigade of current or improved practices. They felt value in their new knowledge and the brigade's deference to them.

When you come off the course the chief looks at you to see what is new, what can you share? You have just done it and can share. (Participant 5, student)

4.2.1.4 Realising potential

Some students not only developed the mechanical skills of firefighting but also discovered deeper growth of character as they progressed through the QF programme. The students reflected on their personal journey through the programme and how it positively affected their ability to manage stress and resolve complex problems in their personal and work life. These students were complimentary of the programme's ability to provide them an opportunity to develop these additional skills.

The course itself, when I walked away from it, it was like the spirit of adventure experience, I came away with all this knowledge, but even more, I grew as a person too and that for me was even more important,

the confidence in the skills you have, to be able to practice skills you don't get to do often, some that are genuinely terrifying for me, I'm actually scared of everything. (Participant 1, student)

I developed confidence on the course, I'm one that will tell you what I think, I think after the recruits' programme and course, I was very stand-off with the Officer, no matter what the Officer said, if you didn't like it you did it. After QF, if they tell me something ridiculous I will say "hold on a second". (Participant 8, student)

They realised that these intangible skills were transferrable from their voluntary firefighter role to their personal and professional life. They found that they were able to apply problem-solving skills and make decisions based on the information that was presented to them.

I really like how I can keep a cool head at work when it gets crazy. Everyone else is just running around like headless chickens. (Participant 6 student)

4.2.1.5 Measuring success

Participants discussed the process they followed to achieve a satisfactory pass of the practical course prerequisites. Many discovered that if they got an assessment question wrong, they were able to repeatedly reattempt it until they eventually chose the right answer. The participants felt that completing the online assessment in this manner was not conducive to developing an understanding of the material or why a particular answer was correct.

You had to guess again if you got it wrong and guess again and again, and you don't really learn that way. (Participant 5, student)

The participants found that the post course consolidation quiz was formatted the same way, with student being able to force their way through passing the quiz immediately after completing the practical course.

The consolidation [quiz] was a rubber stamp exercise at the end of the course, "let's do it as quickly as possible and get your stripe". (Participant 8, student)

When discussing the post course quiz, participant 10 (student) said that the questions should be drawn from wider material than the course as they should still be expected to know the information from previous courses they had attended.

The quiz was broader than the learning material, which was good, because you can't say, I've learnt all that stuff from before, I can now forget that (Participant 10 student)

The trainers discussed the training material further, providing their perspective on how the students are tested on their understanding of it. They stated that the pre-course information is appropriate information, however the way in which the information is retained and how that is tested is inadequate.

There's nothing really wrong with the content, it's the way the information is retained is where the issue is... It's not so much that the material isn't there, it's the fact that you don't really have to learn it, you just keep clicking until you get it right. (Participant 14, trainer)

Participant 16 (trainer) questioned the design of the online assessment as once a student completed it, there was no mechanism to report to trainers if a student had attempted questions multiple times before passing it. He further commented that including this type of reporting may assist the trainers to deliver a more targeted approach during the practical phase or even contact the student prior to the practical phase to clarify the content learnt.

This could be good or bad, but the ability for everybody to pass this now shows that its really really well thought through and its targeting the right learning attributes for the people or it's that easy that everybody can click a mouse and they can pass. (Participant 16, trainer)

The trainers witnessed varying levels of knowledge from students who attended the practical course, explaining that they observed students with only a rudimentary level of preparedness compared to other who were well prepared.

You have others that you can completely tell haven't done anything, or who have been signed off on everything to say they can turn up on a course

but have zero preparedness whatsoever, if they even have gloves.
(Participant 14, trainer)

The trainers expressed the challenges they experienced when having to support unprepared students through the practical phase and the students disconnect with the theoretical knowledge.

if it doesn't happen, you are still there to teach them the practical course, so if they have done that e-learning, there's not much that I can do apart from impart that practical knowledge on them. (Participant 15, trainer)

When a trainer was asked how they identify students who may need extra support, he said that their brigade membership was a good initial indicator of their understanding of the content.

we identify brigades that they come from and we can identify that those brigades generally send well prepared students. So, if students are not from those brigades, or those particular areas, that's how we identify them
(Participant 16, trainer)

4.2.2 Theme 2: Competing Demands

Students discovered that the QF programme required a deeper level of knowledge across a wider range of skills compared to the recruit programme. At the same time, they had to balance the demands of work and family with volunteerism. Students described the challenges of studying at home whilst also dealing with the other personal and family commitments.

4.2.2.1 Time is precious

The availability of time was a challenge for many of the participants who found that their learning needs competed with the wider demands of their brigade. Students described that when they arrived at a roadblock to their learning, whether it was their need to clarify a teaching point, practice a skill or gain assistance in navigating the online aspect, they were met with various barriers that were attributed to the challenges of time availability. Some students described that when they asked for help and were given an excuse by the mentor, the student then procrastinated and waited for support.

They say you have to do it, but if you ask for someone to help you, they say “when I’ve got some time” so it’s quite hard, and because of that, it’s been slacked off. (Participant 10, student)

Students commented on the benefits of including an online component to their learning programme, which was new to what they have experienced previously and more efficient. They found that they did not have to rely on a brigade training officer or their Chief to sign off on certain aspects, which allowed them to progress quickly through the learning content. Once the student completed the online assessment, the learning module automatically submitted the result to the learning management system, which the students found sped up the administrative process, removing the signoff requirements that previously needed face-to-face time with brigade leadership.

From a volunteer point of view, it makes it a hell of a lot quicker and this is a thing on the side, a part time thing to give back to their communities. Time is really important, so the eLearning modules, because they are online, they are quick to do, so I will say that, it’s a huge improvement from the brick you get as a recruit. (Participant 11, student)

The recruit programme, you can do the book quick, but you still have to wait for training to get the chief/BTO to sign their park, and if you miss a training or they aren’t available, then you are delayed more. They have to get you to come and catch up. So, the online is working better that way, you still have the book to refer to. (Participant 5, student)

4.2.2.2 Impact of family

Several students found that completing the online portion of their study was a struggle at home, with the demands of family being present. Participant 4 found that he was able to complete the assessment but not really retain the information after the fact.

Too many distractions, the kids running around, the wife telling me what’s going on TV, it’s not conducive to retaining the information. It would have been better being down at the station, or somewhere else. (Participant 4, student)

Sometimes at home you kind of procrastinate and you let other stuff, stuff outside being a volunteer get in the way. (Participant 6, student)

Other students found that the asynchronous nature of the online portion allowed them to balance family and study better, being able to complete a portion when time permitted and then put it down, engage with the family and return to where they left off at a more convenient time.

At home I have three kids, I could do a bit on that and then bugger off and spend some time with the kids and then come back to it, like I said before, managing your time with everything. (Participant 7, student)

4.2.3 Theme 3: Speed bumps

Students commented on hurdles they faced when navigating through the QF programme. Some students found passive resistance from their brigade towards their progression and learning in the form of being held back from enrolling in the QF programme. The students discussed the accessibility of the online learning environment and the design of the quiz questions as significant hurdles to their learning progression within the QF programme. This theme was discussed in depth by all of the students.

4.2.3.1 Am I ready yet?

Several students felt that they were being held back by their brigade, as they were not supported to progress when they wanted to. They found that they were either impeded or actively discouraged from progressing onto the QF programme by brigade leadership. In these instances, they discovered however, that they were able to self-nominate and complete the course prerequisites without engaging their brigade leadership.

I was basically a year out of my recruits course and having lots of discussion around wanting to do the QF course and sort of being maybe told that it's not worthwhile doing yet, that's why I self-enrolled. I'm there to learn and I don't want to be held back. (Participant 9, student)

Without the BTO signoff he managed to get himself onto the QF course. He rang the training team and told them that we only had one QF and that they needed him, so they fast tracked him without the signoff and got him onto a course. (Participant 1, student)

4.2.3.2 Credibility

Participants felt that the process of self-nomination and rapid progression eroded the perceived credibility that they and other programme graduates received after completion. Students and trainers explained that the QF rank is the first step where they are able to operate with some degree of autonomy. Prior to holding this rank, the firefighter had to be closely monitored and could only be delegated very specific tasks under close supervision. Students explained that these perceptions impact how they are utilised operationally at incidents. Trainers acknowledged that students were coming unprepared and lacked the experience to successfully represent the expected ability of a person holding the QF rank after completing the programme.

For volunteers that are working beside a paid crew, the credibility goes out the window when they are self-applying for courses without any brigade oversight or having to meet standards. (Participant 17, trainer)

4.2.3.3 Accessibility

Participants highlighted the difficulties faced when attempting to gain access to the online learning environment. All participants stated that the rate at which the password required changing was too frequent, especially considering the irregularity at which they have to access the online portal. A majority of the students described the challenges faced by volunteers when attempting to log into the portal remotely from home or work. The students had to have an adequate level of IT literacy, a computer and internet connection to be able to access the online portion remotely.

It's very very technical to get into the e-learning. You have to know your passwords and you have to enter them 5 or 6 times and you have to be reasonably computer literate, which I am, so I didn't have a lot of problem but other people in our brigade would have a lot of problem locating and doing them. (Participant 4, student)

Ten of the students actively worked with computers on a daily basis and found less difficulty in accessing and navigating the online environment compared to others in their brigade. Several of these students described how they were inadvertently seen as a mentor to guide other less computer literate members through the process.

I had no problems with it at all, I'm reasonably computer savvy I think, and all the links I was sent, they all worked fine, at the time I was on the fire service portal a lot anyway as I was doing the promotions work so I knew my way around and didn't have any problems with my log-on, like a lot of people who don't go on there often do. (Participant 2, student)

Others discussed challenges related to the culture of hierarchy present at their brigades, where it was expected that only senior members were allowed to use the organisation's computers, therefore further compounding accessibility issues faced by students.

I've never really seen anyone else use the computers on station right from my initial joining, I just figured that was for the use of the senior – the officers. It seems to be an unwritten law – I don't know if anyone else has personally used them but the only people I've ever seen use those computers is the officers, so you just assume that they are for their use and not yours. (Participant 9, student)

4.2.3.4 Online frustrations

The student participants described that they found the design of the online component to be awkward and got quite frustrated with their ability to answer questions appropriately. As their frustration built, their ability to cement their learning diminished. Participant 1 was not able to find evidential proof that one answer was more correct than another and resigned to the fact that it was a guessing game to find the answer.

It was infuriating, in the end it was a guessing game, it was trying to get the right configuration to get it right. In my mind, none of the information was wrong, if you had the information, why wouldn't you give it to the OIC, I just found it really infuriating. (Participant 1, student)

Participant 1 went on further to explain that even when they utilised the combined knowledge of their brigade, no satisfactory answer was able to be agreed upon.

There was another one too, it was the same type of thing, it just went around in circles, everyone I spoke to didn't know the answer... It wasn't information you could find, it was subjective, it was someone's opinion of

what information you should give off the Hazchem board not because the book says. (Participant 1, student)

Participant 13 concurred with this sentiment, stating further that they just made it up as they went.

There was, like what do you do in a Hazchem incident, they had a list, a lot of pictures and you had to drag what went in there, we didn't have anything about that, so we were guessing and making it up. (Participant 13, student)

Others found themselves questioning their own knowledge during the assessment, because when they answered questions correctly, the design of the question did not recognise where objects were placed and thus returned a negative result.

The harder bit was the one where you had to place things in the right order or in the right place. I think it was like the fire growth phase, you would put it in the right order and it just wasn't accepting it exactly how the boxes were sitting. And there was also one with the Hazchem and what you would include, and you couldn't tell from the pictures what the things were, it was a notebook or something and you were trying to figure out what the pictures were. Were they goggles or something else. The graphics, improving that would help. (Participant 12, student)

4.2.4 Theme 4: Support

Students discussed the support networks that were available to them, their use of these networks and the challenges they faced when the networks were unsatisfactory or unavailable. Trainers also reflected on their knowledge of the journey the students undertook in the pre-course phase.

4.2.4.1 People supporting the learning

Students reflected on the suitability of training mentors within their brigade and their experiences when attempting to interact with them. Several students discovered that they were the first in their brigade to undertake the new QF programme and there was a lack of understanding within their brigade on how to do the online modules. Participant 6 described how, along with several other members, she took the initiative to form a study group within

their brigade to leverage off their combined knowledge. Reflective of the nature of volunteerism - where members bring a variety of skills and external knowledge to the team - some students became mentors for the brigade and their fellow programme participants.

Yea probably, a mentor is probably a good word for it, certainly over the phone if I wasn't there, coaching them through it, here's how you do it, go forth and do it yourself. Done. (Participant 2, student)

Three of the four trainers interviewed were of the understanding that their domain was to deliver the practical aspect only and had not engaged with students prior to the practical course even though students have commented on their need for better learner support from trainers. Two trainers were unaware that the QF programme included an online component or that the students had to complete this prior to being accepted for the practical course.

So, I didn't know there was an online test prior to the course, I just assumed there was pre-course learning paper-wise and that was it. So, I would have to look at it differently next course. (Participant 17, trainer)

Having a [region or programme] trainer contact us would be great, and trainers would know they have set the students up to succeed. (Participant 2, student)

Participant 15 (trainer) explained that he didn't know the pre-course component as well as he should, but then justified it by describing that his role was only to deliver the practical component, and that as long as the students achieved satisfactorily on that, his duty was complete.

I don't know the e-module as well as I should, I suppose it's not my role, but it is in some ways... There's not much that I can do apart from impart that practical knowledge on them, and if they done that and met those competencies, then they are competent of my practical course. (Participant 15, trainer)

Contrastingly, some students explained that they received fantastic support from their brigade throughout their enrolment in the programme. Interestingly these students were primarily from those brigades that had higher response rates (100+ calls a year).

My brigades lucky because of the number of calls we get, our BTOs [brigade training officers] are really up to the play and help us out a lot (Participant 2, Student)

4.2.4.2 Forging ahead alone

Several participants struggled to find the assistance and support they needed from their existing brigade networks. They discovered that a higher level of autonomy and self-discovery was needed to achieve not only the course outcomes, but to also prepare them for the practical course.

We were on our own and had to figure things out on our own. (Participant 7)

No. Not sure why not. I just done it, I am going through the same thing right now with ERD [emergency response driving], there's not really the support from the brigade. (Participant 10, student)

Participant 9 acknowledged that brigade members have external demands on their time however she also identified a lack of willingness for brigade members to offer any support or help.

Having someone that's willing to walk through it in a small town like this, their time is valuable, so that's probably more of a struggle, saying "can I go to someone in my brigade" is anyone actually willing to get in on this and actually be helpful. (Participant 9, student)

Participant 1 found that some unsupportive gender dynamics were at play. As a female, she was not supported to progress. She discovered that as long as she operated within the defined boundaries that the male brigade members expected of her they were happy. As soon as she pursued advancement their sense of normality became threatened and their reaction was to withhold support.

The guys are happy for me to be in the brigade, as a female, as long as I did the things that a female should do, like be the brigade secretary, as long as I'm not progressing to be the boss of anything, like being put in charge of a group for drill, I can see this upset their thoughts of the natural order of things. (Participant 1, student)

4.3 Concluding comments on results

The results of this study identified four main themes that explain the experiences that both the students and trainers have had with the volunteer qualified firefighter programme. Participants discussed the journey they took when engaging with the learning programme and the steps they had to take in order to achieve success. They discussed their frustrations with the ability to access and navigate through the online learning environment. Whilst some students experienced a supportive network that enabled success at every juncture, others discovered that they had to rely on their own ability to succeed as there was no support when they needed it, either due to a lack of knowledge or lack of desire from other brigade members. Students also discussed the experiences and challenges they faced when engaging with asynchronous learning and the implications that it had on their home and family life.

The students who participated in this study demonstrated an ability to engage with technology regardless of age. Female participants did however provide additional commentary regarding their support of other learners in their brigade who were struggling with technology and the e-learning elements.

Trainers discussed the standards of the students who attended the practical course they deliver, commenting on the wide range of ability that the students displayed and the challenges they faced when attempting to produce a student who grasps the fundamental skills expected of the rank. The trainers, however displayed a varying level of understanding of those steps that students have to achieve prior to the practical course, including the online assessment tools. Students witnessed a significant disconnect between the precourse learning and the practical training phases when engaging with the trainers. This separation was also presented by the trainers who mostly were not familiar with the precourse learning material. The discussion section that follows will address these issues in more depth, discussing the results of this study in relation to relevant literature.

Chapter 5: Discussion

This qualitative study explored the experiences of New Zealand volunteer firefighters progressing through the qualified firefighter (QF) training programme, which includes an element of online learning. Previous studies have investigated the training of volunteers (Macduff, 1994; Pardess, 2005; Snook & Olsen, 2006), first responders (Klingensmith, 2005; Landry, 2011) and firefighters (Decremer, 2018; Holmgren, 2014). Other research examines the use of online training and simulation to train first responders (Taber, 2008; Tate et al., 1997; Wilkerson et al., 2008). To the author's knowledge, this is the first study to explore the unique challenges of New Zealand volunteer firefighters' engagement with a self-directed learning approach that incorporates asynchronous online education as part of Fire and Emergency NZ's Training and Progression system (TAPs).

Qualitative data collected from student (volunteer QF) and trainer (teacher) interviews allowed for the incorporation of these two teaching and learning perspectives, which enriched the study through representation of different perspectives. In particular, the interview with students offered important insights into their views of wider organisational aspects as they progressed through the QF programme. Four main themes emerged from the interviews: student's learning journey, the competing demands on their time and resources, the hurdles they faced whilst completing the programme and the support mechanisms they attempted to engage with. The themes identified in this study covered the critical aspects of the students' experience of the QF programme.

Three key discussion points, drawn from the four identified themes, align with existing knowledge of first responder training. First, supporting students' engagement with learning is critical to enhancing operational readiness. Second, it is important to use adult education methods that are suitable for New Zealand volunteer firefighters. Lastly, how programmes are designed informs the perceived credibility of the qualification.

5.1 Supporting learning is critical to the learning journey

Students' desire for support and mentorship was a dominant theme in this study and was discussed by all students in depth. Whilst some students felt that their need for support was met, the majority felt that they were left to experience the learning material alone.

Further many students indicated that adequate support to contextualise the content during the pre-course phase was lacking. This study illustrates how when students are left unsupported, their confidence in their skills and ability is eroded and their ability to understand the content is diminished. The work of Knowles (2014) supports these findings by describing the importance of support. He specifies that adult learners can have varying levels of dependency based on both their commitment to the learning and their confidence in their learning ability (Knowles, 2014). Learners with low commitment and/or low confidence require a higher level of support. This relationship is further supported by Pratt (1988) model of support which identifies the learner's need for direction and its relationship with support. This condition was also documented by Balvin et al. (2007) who discussed how humanitarian aid volunteers who engaged exclusively in online learning and received increased levels of support prior to deployment exhibited lower stress indicators compared to those who received no training support. They concluded that being flexible and responsive to the individual needs of the volunteer was critical to their success.

Students sometimes struggled to obtain adequate guidance from senior members of their brigade, whom they had expected could support them. This study identifies a gap in knowledge and support of senior members who have the responsibility to mentor and support QF in their online training. This situation was experienced more by firefighters of less active brigades than those at high tempo, busy brigades. The 13 student participants represented 10 separate brigades, with varied emergency response activity. Response rates for these brigades ranged from 22 to 752 appliance responses during the 2017/2018 financial year (Fire and Emergency New Zealand, 2018a). Those students who belonged to the more active brigades displayed a higher level of confidence, which can be attributed at least in part to the many opportunities for them to apply the theoretical knowledge of the QF programme operationally and ask questions of their fellow firefighters. At the other end of the spectrum, those students belonging to the less active brigades (under 100 appliance responses per year) were less confident during their learning journey than their busier counterparts. The varying opportunities to learn and low levels of mentorship and support becomes visible in the students' self-identified confidence in their preparation for the practical course and their perceived ability to operationalise the knowledge after completing the programme. The confidence that the students felt appears to be mirrored by the brigade's senior members,

who typically have had less opportunity to maintain an operational tempo that would support currency of knowledge. This study suggests that the participants who were unhappy with the quality of support available to them predominately came from brigades that were less busy than those who were satisfied. Participant 16 (trainer) supported this finding by discussing how students who belonged to quieter brigades typically did not perform as well as those from busier brigades. He stated that trainers used the students brigade membership as a general prediction tool of student performance during the practical course.

Mentor's time and availability is a significant contributing factor to supporting students' learning. A number of students reported being ignored or diverted when trying to seek advice or a lack of opportunity to practice skills at training nights. These students found that they were left to their own devices when attempting to understand difficult concepts or to increase their preparedness by practicing skills. McLennan, Birch, Cowlshaw, and Hayes (2008) identified that training and demands of time contributed towards dissatisfaction in volunteer firefighters, proposing that well led brigades with engaged leadership were more likely to enable success.

Of particular concern was the experience reported by one student, who discovered that she was not receiving support because she was a woman. She discussed the culture within her brigade that enforced historical stereotypes of women holding support roles rather than the firefighters. The culture present at this brigade provided an unsupportive environment for her to complete her studies. The negative impact of gender is supported by a wider study conducted by Branch-Smith and Pooley (2010) who found that many female firefighters experience covert discrimination in a range of circumstances including the allocation of support roles, such as brigade secretary, in lieu of operational duties. Though not a solution to rectify this brigades culture, actively offering students alternative support avenues can help to overcome the immediate discrimination that female students encounter when seeking advice and support of their learning.

Some students who were unable to source adequate brigade support were successful in finding external learning support. They identified people in the wider organisation whom they felt were approachable and had currency of knowledge. Students who were able to leverage these relationships were able to satisfy their need for greater support. This study highlights the importance of students having multiple support pathway options with informal

relationships being key to learners' development. This position has been documented by Mezirow (2000) who discussed the important role of supportive relationships in developing more confident adult learners. Robertson (1996) also examined the importance of relationships to empower learners. Robertson (1996) further emphasised the importance of trust and respect within these relationships, highlighting that transformative learning requires trust between mentor and learner in order to support a transformation of understanding. One student participant created a study group with other students to leverage their combined knowledge. This student commented on the successful use of this study group to pass the online assessment and prepare themselves for the practical course.

The suitability of brigade training staff was identified as a concern by several students. The work of Lowry (1989) and Daloz (2012) highlights the significance of mentoring adult learners. Lowry (1989) identifies how some adult learners are incapable of engaging in self-directed learning and need ongoing support to succeed in online learning. Students in his study described that a combination of factors including the trainer's lack of interest, lack of knowledge or the ongoing challenges of time led to the lack of support they experienced (Lowry, 1989). The selection and training of in-house volunteer trainers has been identified as a need in order to support learners. Not all volunteers firefighters have the disposition, passion or knowledge to be mentors nor are the most senior members the best fit. Tang, Morrow-Howell, and Choi (2010) identifies the additional responsibilities of staff when mentoring. Newbury (2015) states that mentors not only pass on experience and knowledge, but also assist in instilling core values and ethos of an organisation. As such, it is important that suitable people are selected – through a formalised selection process - and trained to be mentors in order to be successful in the role of brigade trainer.

This study has shown the critical importance of adequate support to a student's perception of preparedness that leads to stronger confidence in their ability and sense of belonging. It is recommended that multiple avenues of support be offered to better assist students on their learning journey. As students differ in their levels of knowledge, experience and ability, and the culture within their brigades can either encourage or suppress progression, having multiple avenues of support available ensures that all students have the best opportunity to learn. These avenues can both be formal and informal, learning strategies can be offered to the learner and better support offered to the brigade mentors to enable

successful engagement. It is suggested that regular contact with the student from an external trainer would be beneficial to the student's learning journey, so as to contextualise learning points with best practice guidelines. Enabling study groups that bridge across brigades is another possible mechanism that would enable the development of confidence and support learners in their journey through the programme. The regional training team or a designated volunteer training coordinator could facilitate these study groups. Numerous studies have discussed that supporting learners enables training and education (Knowles et al., 2014; Mezirow, 2000; Pratt, 1988) and training enables retention of volunteers (Fahey, Walker, & Sleigh, 2002; Macduff, 1994; Snook & Olsen, 2006; Thompson III & Bono, 1993).

5.2 Adult education approaches for volunteer firefighters

Students in this study described their preferred learning styles that were analysed referencing the literature on adult learning methodologies. Participants described various learning experiences that benefitted them throughout their QF programme. They also explained certain methods that aligned with their preferred learning styles which may inform future instructional design to better support first responder education. Students also explained their experiences with the online learning environment and how they felt when accessing and engaging with it.

The qualitative approach used for this research allowed for an in-depth exploration of students' unique perspectives on their learning needs. Despite the students' wide-ranging experiences, common themes in the students preferred learning styles emerged. Students described their preference towards practical learning with the majority referring to themselves as kinaesthetic learners. Operational Skills Maintenance (OSM) is a section within the online Station Management System (SMS) that records firefighters' completion of reoccurring skill revalidations. OSM tasks are programmed and signed off by brigade trainers, officers or other approved personnel. Currently, the QF programme does not require students to undertake any specific practical training other than being current with their OSM. Some participants commented on the trustworthiness of OSM as a mechanism to reflect currency of competence as brigades will often sign members off 'en masse' without each individual having to perform the skill that is being signed off. Consequently, one recommendation from this study is to include practical pre-requisites to the pre-course requirements. The inclusion

of practice-based learning activities throughout the pre-course phase is supported by studies of first responders' learning needs. For example, Charman (2017) investigated police learning needs and found that they prefer methods that support 'learning by doing'. In another study, Holmgren (2014) investigated various training delivery styles for Swedish firefighters and identified how practical skills dominate as the learners' most preferred learning method.

First responders are fundamentally problem solvers (Hintze, 2008; Landry, 2011), therefore encouraging critical reflection and experimentation within the learning environment will set them up to apply these unique skills operationally. Kolb's (2014) experiential learning model (ELT) supports the student's need to experience skills practically and reflect on the process; however, two significant factors identified by Vince (1998) complicate the application of ELT to the training of firefighters. They are 1) the potential safety implications involved in student experimentation; and 2) the hierarchical influences that can limit experiential learning. Both complicating factors only become present during the final experimentation phase in the cyclic process of ELT and do not diminish the importance of the previous three phases (i.e., experience, conceptualisation, reflection). Research by Baker, Jensen, and Kolb (2005) discusses the use of conversation as a mechanism to apply experiential learning. The premise being that dialogue provides a process in which experimentation can be utilised whilst training within a hazardous occupation, such as firefighting. They further discuss the influence that power may have on the ability to fully examine the range of outcomes, which relates closely to Vince's (1998) second complicating factor: hierarchy. As discussed in the previous section, optimum learner mentorship enhances learner success, which is enhanced by an understanding of the ELT model. Brigade mentors and trainers therefore require their own support to transition from a historically autocratic (McLennan et al., 2008) teaching style to a nurturing, supportive and facilitation one. The researcher suggests there is a place for experiential learning when it is supported by knowledgeable mentors and trainers. Within the brigade training environment, a mentor should start by defining parameters within which students can experiment and encourage open dialogue between students if training in a group. In this way, solutions are hypothesised, fact checked, and risks are mitigated if not already done so by the students. In this way, the fourth phase of the ELT model is applied, and Vince's critiques are addressed.

More than half of the students took some form of written notes to assist with their learning. Several students went further, describing their use of a reflective journal to link their learning with emergencies they attended. They were able to relate theoretical learning to incidents attended as well as contrast operational experiences to new learning constructs. A study by Childs (2005) documented the benefits of critical reflection for contemporary firefighters. Another study by Lloyd (2007) further explores the embodiment of knowledge for firefighters through critical thinking and reflection. Studies by Caffarella and Barnett (1994) and Howe (1970) reinforced the need for adult learners to be able to take notes and reflect as part of their experiential learning journey. A reflective journal also aligns with Knowles' (2014) third and fifth principles: '*the role of experience*' and '*orientation to learning*'. Knowles poses that adult learners reflect on their experiences and apply this knowledge to new concepts of learning, he also states that adult learners need to find a reason why they are undertaking particular learning, which a reflective journal would support as they could link present theory with past experiences.

The recommendation from this study is to provide students the opportunity to write thoughts or reword learning material to increase comprehension and provide a mechanism for students to learn through reflection. Similarly, providing firefighters a learning journal when they join is another option that would support the various learning styles of volunteer firefighters and encourage reflection. By providing a journal, the firefighter would be better able to orientate to the learning as they reflect on practice or contrast experiences to their learning situation.

The online learning environment was discussed in depth by all participants, who expressed varying levels of acceptance, understanding and engagement with it. Accessibility was discussed by most students as being their biggest issue. The process of logging into the online environment frustrated the users with one describing it as "*my biggest bug bear*" (participant 11, student). Providing a robust yet simple log-on process that works from multiple devices and locations is essential to successfully engaging with the end user. The student's perceptions of how often they need to update their password may be influenced by the frequency of their access to the online portal outside directed learning such as the QF quizzes. This impression can be improved by changing one of the two variables: by either increasing the frequency that firefighters must access the online environment or, extending

the lifespan of a password before it needs to be changed. The recommendation from this study is to offer a two-factor security access process that would extend the password lifespan whilst meeting the organisations security requirements. The challenges of digital security for online learning platforms are discussed by several authors (Alwi & Fan, 2010; F. Graf, 2002; Raitman, Ngo, Augar, & Zhou, 2005). F. Graf (2002) supports the researcher's recommendation of making two-factor authentication available as a method to ease the access frustrations of learners whilst meeting the organisations concerns for security. Alwi and Fan (2010) also added that factors such as internet bandwidth, connectivity, and the security of the learner's computer are issues that compound the accessibility of the online learning environment. Students identified that at times, connectivity either at home or at station were barriers to engaging with the online environment.

How the online assessment questions were designed was another common issue raised by study participants. Overall, the majority of students were satisfied with most of the question design; however, several students stated that they *"switched off to learning"* (participant three, student) as they repeatedly attempted questions with various answers until they managed to find the correct one to *"make the computer happy"* (participant four, student). Students explained that whilst a variety of questions were good, the way some of the questions were designed caused significant issues for them. The questions that required the learner to move words or images into certain locations on the screen proved to be of particular concern. For instance, Participant 1 (student) identified several instances where multi-answer questions (MAQ) caused frustration. She could not understand why a certain combination of options were deemed to be the correct answer. She discussed how she searched reference material, consulted with other students and brigade members, and even contacted a regional trainer in an effort to confirm why the answer was the correct one. The inability to find the correct reference gave her cause for concern, and a reason to doubt the validity of that particular question and also that of the entire quiz. This situation has also been documented by Cook and Jenkins (2010) who discussed e-assessment design, with particular emphasis on e-design limitations. The authors suggest that questions have to be carefully designed in order to remove ambiguity while remaining accurate to the source material. The recommendation from this study is for clearer, objective questions to be developed directly from the reference material so that students are able to find the passage where the

information originates, rather than being a student's interpretation of 'what would work'. Additionally, increased testing of the quiz by qualified end users is encouraged, including the use of various devices and locations to further increase the robustness of the process.

The satisfaction of the learner is an important aspect of measuring the performance of e-learning systems. A study by Hadullo, Oboko, and Omwenga (2018) placed user satisfaction as one of the top criteria of e-learning. The other aspects they discussed were 1) information quality; 2) service quality; and 3) academic achievement. This study suggests that whilst the students were required to complete both a pre-course and a consolidation quiz to validate their theoretical understanding, it was impossible for them to fail these assessments. Students indicated that they were given unlimited attempts to get a question right before progressing to the next question. The researcher questioned the students on their ability to recall any of the information that was tested. The majority of the students explained that they were not able to. Cook and Jenkins (2010) highlight the value of e-assessments as a powerful tool to solidify knowledge, provide instant feedback to students and allow students to revisit questions that they needed to re-answer. Cook and Jenkins (2010) also discussed the value of results being accessible to educators, who could then adapt teaching to meet students' needs.

Several students made positive comments about the introduction of online quizzes that reduced their overall workload and complimented their busy schedules. They discussed how the challenge of balancing family, work and volunteering was made easier by reducing the amount of written work they had to complete. Students found that they were able to access the quiz from multiple sites, such as their station or home. Another helpful accessibility consideration was the ability to complete portions of the quiz at different times, when they had a moment. Whilst completing the online portion at home was not for everyone, the asynchronous nature of it was considered beneficial overall. Studies by Pelletier (2005) and Maxfield (2008, 2009) support the benefits of asynchronous learning for the modern student as they navigate the complexities of multiple demands on their time. Maxfield (2009) further suggests that asynchronous online learning is an important and effective method of educating firefighters (p.19) who face the challenges of shift work, emergency responses and other demands on their time.

Several students however commented that even though they would have preferred to complete the online portion at their fire station, they felt that this was not allowed. They described the culture of their brigade that led them to believe that FENZ PCs were only for the officers to use, and that they had to find their own device and access point to log into the learning system. Other students commented on the need to be able to access the online material and quiz “*anytime, anywhere*” (participant 2, student) and strongly desired a mobile friendly platform to be developed. Numerous studies, such as those by Haag (2011), Keegan (2002), and Qingyang (2003) attest to the benefits of mobile enabled learning (m-learning) and that it is the natural successor from traditional e-learning.

The researcher observed that the trainers exhibited a lack of understanding of the overarching programme and what it comprised of (i.e., pre-course, practical course, consolidation). Only one trainer was conversant with the content of the online assessment material, whereas the remainder either did not understand the content as well as they should or were not aware it existed at all. Participant 2 (student) discussed tell-tale signs he witnessed during his practical course, which support this finding. He described how the trainers appeared to be at odds with each other, not being able to agree on common terminology or processes that would have been known if the trainers had been conversant with the pre-course material and online quiz. As a result, the findings of this study suggest a need for all trainers to have in-depth knowledge of the programme in order to deliver a cohesive and complementary practical programme component that complements and supports the pre-course online quizzes and support the material. The researcher suggests that trainers should maximise the learning potential for the quizzes to inform their knowledge of the students’ capabilities, and correspondingly draw on pre-course material to inform the planning of their training delivery. In addition to greater overall programme alignment, trainers would be better placed to identify gaps in student knowledge, contextualise the pre-course learning into their practical course, and scaffold students’ learning in a logical sequence through their practical programme components (Pea, 2004; Taber, 2008). These suggestions are supported by the research of Ruan (2011), who found that instructor programme knowledge and credibility contribute significantly to the success and acceptance of first responder students.

5.3 The programme design informs the quality of the qualification

The design of the overall QF programme was discussed by the participants in various ways. They provided insight into the perceptions and attitudes of other firefighter's brigades towards the credibility of the programme. When questioned, participants offered suggestions that could improve the course design and therefore improve the perception of the programme. Whilst Monteiro (2017) claims that there is no conclusive evidence that course design is the primary factor of learner satisfaction or course credibility, the participants' suggestions in this study offer a number of recommendations that hold the potential to enhance the QF programme's design.

As discussed in section 5.1, several participants discovered that they were able to self-enrol in the programme, thus circumventing the nomination and endorsement of their brigade leadership. The process of self-enrolment was also discussed by trainers, who felt that students who did not have the support of their brigade, or who side-stepped the conventional enrolment process were viewed as rogue-like and, on completion of the programme, were undervalued by their brigade. Students discovered that they were able to enrol, complete the pre-course, practical course and consolidation phases without their Chief or brigade trainer signing any documentation. They would complete the programme and be issued the programme certificate and expect to be given the rank markings of a QFF. It is recommended that implementing brigade sign off through the enrolment process will be a significant step in the right direction and give the brigade leadership the sense of ownership in the student's progression. This cannot be fully implemented without addressing the reasons why students felt they had to circumvent their brigade leadership in the first place, therefore enhancing the support available to both the students and the brigade leadership would be essential.

The trainer who had engaged with the QF online quiz questioned the benefit of this. He suggested that students should be able to get questions wrong so as to measure their knowledge rather than allow them to guess their way through the quiz. He further discussed that providing trainers the ability to view analytical data from the pre-course quiz would be beneficial. Providing trainers with this information would enable them to better support the student's learning throughout the programme, targeting specific training to meet the identified gaps in knowledge or areas of concern. The benefit of analysing e-learning data has

been discussed in depth by a number of authors, such as Benson and Samarawickrema (2009), Chen, Lin, and Kinshuk (2008), S. Graf, Ives, Rahman, and Ferri (2011), and (Sirkemaa, 2014). Some students had a delay of over eight months between completing the quiz and their practical course and were not able to re-attempt it. Several students identified that the time delay was significant enough that they had forgot what was in the quiz, and what the correct answers were. Providing an option to access the quiz again or adding a second, shorter refresher quiz that the students have to complete within a specified timeframe of attending the practical course would close this identified gap.

As discussed in section 5.2, the dominant learning style of the participants in this study was kinaesthetic and the researcher suggested that practicing skills during the pre-course phase was important in assisting the students to learn. Additionally, by adding in the requirement of practice, brigades would be encouraged to engage with the student as they progressed through the programme. This would further increase the brigade's support of the student, increase the brigade's knowledge of the programme and provide an additional mechanism to validate the programme outcomes. As discussed by participant 12 (student), students who finish a programme are seen as those who have the most current knowledge and can be drawn on to upskill their fellow firefighters.

Several students and trainers commented on the speed at which students could complete the consolidation phase of the programme, stating that some were able to log-in and complete it in the van on their way home from the practical course. Under the current programme structure, a perception of "fast-tracked" firefighters exist where some individuals have quickly progressed through their online programme leaving doubt about the credibility of their knowledge and skills. Participant 17 (trainer), who is also a career firefighter, claimed that when a volunteer has the ability to circumvent the traditional enrolment process, they lose operational credibility. A negative outcome of this fast-tracking/enrolment issue is that some career firefighters may resist delegating any meaningful tasks to the volunteer member as there remains questions concerning the volunteer's applicable experience and capability to complete the task. Participant 2 (student) discussed the potential benefits of having a practical 'on station' consolidation, stating it would enable the student to adapt their learning to the idiosyncrasies at different brigades. Adding a practical consolidation session at the student's brigade would allow these variations to be addressed and further improve the

credibility of programme graduates when the rest of the brigade can attest to seeing them achieve these milestones.

A benefit of adding the online components to QF programme was that when students completed the pre-course and consolidation quizzes, the learning system would automatically generate the appropriate notifications. Students highlighted that other training packages relied on paperwork to be signed, scanned and emailed or faxed. In these programmes, there was a tendency for the paperwork to go missing which adversely delayed their enrolment or completion by a significant amount of time. To leverage off these improvements, the researcher suggests adding the ability for chief and brigade trainers to sign off the practical aspects online which would address the need for brigade engagement but ensure a streamlined administrative process was maintained.

5.4 Recommendations and implications

Recommendations have been made throughout this chapter based on qualitative data gathered from participants that is supported by the academic literature. These recommendations have been summarised in Table 6 below. This study has contributed to addressing a gap in the literature regarding the training of volunteer firefighters and explores the needs of adult learners enrolled in volunteer and first responder education. The results of this study indicate that understanding students' experiences can allow for enhancement of the programme design, offer alternative support mechanisms, and adapt to the learning needs of the students.

New Zealand firefighters "serve their communities to protect and preserve life, property and the environment" (Fire and Emergency New Zealand, 2017a, p. 3). To achieve this objective, firefighters' must be trained, and that training should be designed in a way that firefighters are motivated to learn, orientated to the learning content and are able to retain the knowledge within a timeframe that supports their busy life. There are many benefits of this style of programme delivery that have been identified by the participants of this study. However, this study can inform improvements to firefighter training, so it can evolve and better address the needs of the students. Specifically, there are recommendations to improve

the method of enrolment, the design of the online assessments, the support mechanisms available to students and developing the trainers' understanding of the programme.

Numerous findings from this study may also be applicable to related first responder organisations (i.e., paramedics, civil defence and emergency management volunteers and surf life-saving staff) by suggesting recommendations to develop their distance education programmes to better address the needs of their volunteers. One of the dominant themes throughout this study was the need to support staff undertaking distance education. So, whilst distance education delivered via e-learning is a significant move towards true asynchronous learning, the importance of face-to-face contact and the continued support of learners, trainers and brigades is essential to the success of training volunteers.

This study firmly demonstrates how trainers involved in the delivery of the practical phase of the programme lack an understanding of the programme in its entirety. To address this gap, the researcher suggests that trainers are provided an opportunity to undertake the pre-course and consolidation quizzes, have on-going engagement with students throughout the programme and develop a deeper understanding of the material. Practically, trainers will need to invest more time with the students and the programme overall, rather than just attending the week of the practical course. This will have some financial implications; however, the benefits to the students and the organisation overall would be significant. Selecting, training and developing volunteer brigade mentors will also have some financial implications. Whilst this study focuses on urban volunteer firefighter's experiences, the majority of the findings may also inform wider organisational changes that would benefit rural volunteers and career firefighter training utilising the phased approach of a TAPs programme with e-learning or e-assessment.

This study provides valuable information that will assist e-learning designers to further refine the way that online quizzes are developed. As this is the first study to explore the experiences of students enrolled in the QF programme, this study offers critical course design feedback that holds the potential to enhance student learning in a short time frame. Continued consultation with the firefighters, trainers and brigades will ensure that the product delivered meets their learning needs, preventing the potential roll-on effect of switched-off learners.

An opportunity is presented to develop policy surrounding support mechanisms that could be made available to students undertaking study, including both internal and external

options. Additionally, it is recommended that a communication strategy is rolled out that encourages volunteer firefighter use of brigade computers, overcoming the “computers are only for officers” notion that exists in some stations. Lastly, guidelines should be developed that provide timeframes between each phase of the programme, supporting knowledge retention, as many students claimed that they had forgotten much of the theoretical content between completing the pre-course phase and their practical course.

Table 6: Summary of recommendations

Category	Recommendation	Rationale
Support	Increase pre-course support to students	Increased support will improve student learning to help understand the content and practice new skills
	Provide options for external support to students	Students identified external support as critical when they faced roadblocks within their brigade
	Support the creation of study groups/skills sessions for programme students	Facilitate peer learning and reflection between students, supported by a mentor or regional trainer
	Selection process for brigade trainers	Right person for the job supported by regional trainers
	Support student accessibility to Fire Station computers	Address the needs of those who do not have access remotely or prefer to complete it at station but are prevented from doing so due to custom, culture or perception
	Provide trainers with detailed analytics from the quiz	Early support can be provided to students and their brigades prior to the practical course and additional, targeted practical sessions will address learners' needs
Adult Education	Provide scenarios to brigades that outline opportunities for students to experiment	Provide brigades with guidelines to encourage experiential learning safely within defined boundaries and under supervision
	Add location for notes in pre-course material	Supports different learner types, specifically for those who take notes
	Create and offer a learning journal	Provides an opportunity to reflect on practice, life-long learning, developing both as a firefighter and a person
	Adjust the log-in process	Students identified logging in and accessing the online environment as difficult, causing frustration and reducing their want to learn
	Ensure quiz questions are objective and answers can be found in the course literature	Increasing the objectivity and robustness of quiz questions will ensure students can orientate to the learning material
	Simplify drag-and-drop, and multi answer questions (MAQ) in quiz	Reduce frustrations and students switching off to learning
	Allow for failure during the quiz	Requires learning to happen. Students and trainers can review incorrect answers and provides a mechanism for feedback
	Allow quiz access within specified timeframe of starting the practical course	Students can refresh their knowledge of the theoretical components prior to starting the practical course
Programme Design	Add mobile accessibility	To further enable asynchronous learning
	Trainers involved in practical course delivery should receive instruction about the overall programme and have to attempt the pre-course quiz	Ensures standardisation of terminology. Better supports students. Enables scaffolding of student learning. Provides consistency throughout programme.
	Add pre-course practical sign off in lieu of OSM compliance	Increases buy-in from brigade leadership. Addresses students' need to practice. Improves specific course related competence

	Programme and course applications to include CFO signature	Gives brigade leadership ownership and accountability of their staff
	Include practical skill sign-off AT STATION during consolidation phase	Provide opportunity for student to demonstrate skills with brigade. Allow for transfer of latest methods to other brigade members, increasing currency of more staff.

5.5 Study strengths and limitations

There are numerous strengths of this study. Firstly, this study focused on the experiences of New Zealand volunteer firefighters enrolled in the QF programme. Other literature has explored the challenges of firefighting (Denef et al., 2008), volunteerism (MacNeela, 2008; Omoto & Snyder, 2002) and first responder training (Baumann et al., 2011), however this is the first study to explore the unique challenges that New Zealand volunteer firefighters face as they undertake training with a self-directed online component.

Another strength of this study is its qualitative nature, which allowed for the collection of rich, in-depth data about participants' experiences. The semi-structured nature of the interviews provided the researcher the opportunity to explore verbal and non-verbal cues and follow emerging issues as they appeared (Dearnley, 2005). Additionally, both students and trainers were interviewed which provided different perspectives to issues raised and added further depth to the study, enhancing the recommendations offered.

Four study limitations are presented here. First, the request for participation was distributed to students' FENZ registered email address by the programme administrator. The administrator was very supportive in assisting the researcher however other regular work took priority over the distribution of the PIS, which resulted in a delay in obtaining sufficient participants in a timely manner. As the initial request and PIS were solely distributed via email, only those students who had the IT literacy to access and reply were able to participate, which may have limited participation.

Secondly, only those enrolled or teaching in the QF programme were selected, which limited the pool of participants available and excluded career and volunteer rural firefighters, however they were the only group positioned to provide data that included their experiences with the online learning environment and quizzes.

Thirdly, the researcher's position as a FENZ certified trainer may have had some impact on the students' decision to participate in the study or their responses. Even though the researcher was not delivering the QF programme, he delivers other training courses that potential participants may have attended or want to attend in the future, such as the recruit programme, driving and pump operation courses. To minimise the influence that the researcher's position may have had on participants and their ability to freely express themselves, interviews were conducted at a neutral location and civilian attire was worn, thereby removing uniform and rank. These steps were identified in section 3.7 and highlighted in the ethics application.

Lastly, the qualitative nature of this study means that the findings cannot be generalised to the entire population. The findings can be attributed to the participants and particular inferences made to their brigades as the students often spoke of experiences within this environment. However, some of the findings may be helpful to guide training programme developing for other emergency responder organisations nationally and internationally.

Chapter 6: Conclusion

Volunteer firefighters are the backbone of the nation's fire service. They stand ready to respond to all types of emergencies, selflessly sacrificing their time to support their communities in times of need. This study argues for their best possible training support to ensure they maintain optimal operational readiness. The aim of this qualitative study was to understand the experiences of New Zealand volunteer firefighters engaged in the qualified firefighter training programme. This group was selected as they were uniquely placed to contrast their previous firefighter training with that of the QF programme, providing a rich and detailed account of their experiences. Previous studies have examined volunteerism (Cowlshaw, McLennan, & Evans, 2008; Eisner et al., 2009; Fire and Emergency New Zealand, 2017a; Volunteering New Zealand, 2015), training of firefighters (Baumann et al., 2011; Childs, 2005; Holmgren, 2014), and adult education methodology (Caffarella & Barnett, 1994; Knowles et al., 2014; Mezirow, 1981). By addressing the research question, this study contributes to filling the gap that links these three areas together within the New Zealand context. Study findings identified how the methods utilised to train volunteer firefighters have a significant impact on how they understand the learning material, and their perceptions of preparedness for operations.

This study identified several factors that impact how students experience the QF programme. The quantity and quality of support that students received during their enrolment was the most significant factor. Students however demonstrated their resourcefulness as they explained various methods they utilised to overcome the lack of support. Methods, such as creating study groups, seeking assistance externally or keeping a journal so they could critically reflect on incidents and contrast these experiences with the theoretical learning of the programme were used by students. This study also established that students who came from the less busy brigades were in more need of learning support than those who regularly attend callouts and have more 'facetime' with other brigade members.

The design of the e-learning quizzes and the students' frustrations when attempting to gain access was another factor that influenced their experiences. Whilst the quizzes provided an opportunity for students to complete them from home when it suited, this study discovered the limitations that did not allow for true asynchronous learning and opportunities

to capitalise on this medium have been missed. Supporting mobile-learning would be a welcomed advancement, as would the introduction of limited attempts to answer each question rather than the current design which allows for multiple attempts until the student chooses the right one. Programme designers and trainers would also benefit from the analytical data that can be generated from these quizzes, providing valuable information that would allow for refinement and targeted support for the students.

6.1 Future research

Study participants demonstrated at least some form of digital literacy, assumed from their ability to respond to the request for participation and engaging with the online learning environment. Future studies could concentrate on volunteer firefighters with minimal IT literacy with the aim of exploring how these firefighters compensate when engaging with the hurdles of the online learning environment.

This study discovered some issues relating to gender and power in the workplace and how it related to the participant's experience of the learning journey. Other studies have also identified similar issues within the Australian context (Branch-Smith & Pooley, 2010; Cowlshaw, Evans, & McLennan, 2008; Fahey et al., 2002; McLennan, 2005). Future research could investigate the impact that gender and power have on firefighters' experiences in training and brigade life within New Zealand.

Study findings suggested that when students started in the field of firefighting, they received training in a teacher-led pedagogical approach. As they progressed through their career, a paradigm shift allowed them to move towards a more adragogical learner-led experience. Future research would benefit from exploring the changes in students' perceptions as they transition from recruit training through the various rank and specialist programmes. A longitudinal study could identify any changes in student learning styles as they progress through their career.

This research was confined to those volunteers that belonged to the urban portion of FENZ, as they are the only volunteers that were enrolled in the QF programme. After FENZ has completed the three-year integration phase, bringing rural and urban together, it would

be advantageous for future research to include how rural firefighters participate with the FENZ training systems and utilise the online learning environment.

Finally, it is suggested that as the recommendations of this study are implemented, an evaluation study is undertaken to understand the students' experiences, the trainers' understanding of the programme, and further refine it and the support mechanisms being employed to improve the learning environment and experience for firefighters.

7. References

- Alkema, A., Murray, N., & McDonald, H. (2013). "You can't be selfish in the country" *Motivating, recruiting and retaining volunteer fire fighters in rural communities in New Zealand*.
- Alwi, N. H. M., & Fan, I.-S. (2010). E-learning and information security management. *International Journal of Digital Society (IJDS)*, 1(2), 148-156.
- Anderson, J. C., & Moore, L. F. (1978). The motivation to volunteer. *Journal of Voluntary Action Research*, 7(3-4), 120-129.
- Arghode, V., Brieger, E. W., & McLean, G. N. (2017). Adult learning theories: implications for online instruction. *European Journal of Training and Development*, 41(7), 593-609.
- Baker, A. C., Jensen, P. J., & Kolb, D. A. (2005). Conversation as experiential learning. *Management learning*, 36(4), 411-427.
- Balvin, N., Bornstein, J., & Bretherton, D. (2007). Current trends in the selection, training and support of Australian and Canadian volunteers: The issue of volunteer stress. *Australian Journal on Volunteering*, 12(2), 6.
- Baumann, M. R., Gohm, C. L., & Bonner, B. L. (2011). Phased training for high-reliability occupations: Live-fire exercises for civilian firefighters. *Human factors*, 53(5), 548-557.
- Baumgartner, L. M. (2001). An update on transformational learning. *New directions for adult and continuing education*, 2001(89), 15-24.
- Beaton, R. D., & Murphy, S. A. (1993). Sources of occupational stress among firefighter/EMTs and firefighter/paramedics and correlations with job-related outcomes. *Prehospital and disaster medicine*, 8(2), 140-150.
- Benson, R., & Samarawickrema, G. (2009). Addressing the context of e-learning: using transactional distance theory to inform design. *Distance Education*, 30(1), 5-21.
- Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., . . . Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of educational research*, 74(3), 379-439.
- Boshier, R. (1971). Motivational orientations of adult education participants: A factor analytic exploration of Houle's typology. *Adult education*, 21(2), 3-26.
- Branch-Smith, C., & Pooley, J. A. (2010). Women Firefighters' Experiences in the Western Australian Volunteer Bush Fire Service. *Australian Journal of Emergency Management, The*, 25(3), 12.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Bryant, R. A., & Harvey, A. G. (1996). Posttraumatic stress reactions in volunteer firefighters. *Journal of Traumatic stress*, 9(1), 51-62.
- Caffarella, R. S., & Barnett, B. G. (1994). Characteristics of adult learners and foundations of experiential learning. *New directions for adult and continuing education*, 1994(62), 29-42.
- Cerno Limited. (2003). *Assessing and selecting high performing fire service recruits of the future*.
- Charman, S. (2017). Training and Education in Policing. In *Police Socialisation, Identity and Culture* (pp. 63-90): Springer.

- Chen, N. S., Lin, K. M., & Kinshuk. (2008). Analysing users' satisfaction with e-learning using a negative critical incidents approach. *Innovations in Education and Teaching International*, 45(2), 115-126.
- Childs, M. (2005). Beyond training: new firefighters and critical reflection. *Disaster Prevention and Management: An International Journal*, 14(4), 558-566.
- Christchurch libraries. (2018). *Ballantynes fire*. Retrieved from <https://my.christchurchcitylibraries.com/ballantynes-fire/>
- Clark, M. C. (1993). Transformational learning. *New directions for adult and continuing education*, 1993(57), 47-56.
- Clarke, V., & Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The psychologist*, 26(2), 120-123.
- Cook, J., & Jenkins, V. (2010). Getting started with e-assessment.
- Cowlshaw, S., Evans, L., & McLennan, J. (2008). Families of rural volunteer firefighters. *Rural Society*, 18(1), 17-25.
- Cowlshaw, S., McLennan, J., & Evans, L. (2008). Volunteer firefighting and family life: An organisational perspective on conflict between volunteer and family roles. *Australian Journal on Volunteering*, 13(2), 21.
- Coyne, I. T. (1997). Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *Journal of Advanced Nursing*, 26(3), 623-630.
- Crichton, M., & Flin, R. (2001). Training for emergency management: tactical decision games. *Journal of Hazardous Materials*, 88(2), 255-266.
- Daloz, L. A. (2012). *Mentor: Guiding the journey of adult learners (with new foreword, introduction, and afterword)*: John Wiley & Sons.
- Dearnley, C. (2005). A reflection on the use of semi-structured interviews. *Nurse researcher*, 13(1), 19-28.
- Decremer, J. (2018). *Improving Recruitment and Retention of Volunteer Firefighters*. Walden University.
- Denef, S., Ramirez, L., Dyrks, T., & Stevens, G. (2008). Handy navigation in ever-changing spaces: An ethnographic study of firefighting practices ACM. Symposium conducted at the meeting of the Proceedings of the 7th ACM conference on Designing interactive systems
- Dewey, J. (1958). *Experience and nature* (Vol. 471): Courier Corporation.
- Eisner, D., Grimm Jr, R. T., Maynard, S., & Washburn, S. (2009). The new volunteer workforce. *Stanford Social Innovation Review*, 7(1), 32-37.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.
- Fahey, C., Walker, J., & Sleigh, A. (2002). Training can be a recruitment and retention tool for emergency service volunteers. *Australian Journal of Emergency Management, The*, 17(3), 3.
- Fenwick, T. J. (2001). Experiential Learning: A Theoretical Critique from Five Perspectives. Information Series No. 385.
- Fire and Emergency New Zealand. (2017a). *2017 - 2021 statement of intent*. Retrieved from <https://fireandemergency.nz/assets/Documents/About-FENZ/Key-documents/FENZ-Statement-of-Intent-2017-21.pdf>
- Fire and Emergency New Zealand. (2017b). *Annual Report for the year ended 30 June 2017*.
- Fire and Emergency New Zealand. (2018a). *Volunteer appliance response data, FY17/18 - Data and Spatial Intelligence*, Fire and Emergency New Zealand

- Fire and Emergency New Zealand. (2018b). *Women in Fire and Emergency New Zealand*. Retrieved from <https://women.fireandemergency.nz/about-us/>
- Fleming, N. D. (2001). *Teaching and learning styles: VARK strategies*: IGI Global.
- Flint, C., & Brennan, M. (2006). Community emergency response teams: From disaster responders to community builders. *Rural realities*, 1(3), 1-9.
- Fowler, J. (2008). Experiential learning and its facilitation. *Nurse Education Today*, 28(4), 427-433.
- Fox, J., Hebert, L., Martin, K., & Bairnsfather, D. (2009). An examination of the benefits, preferred training delivery modes, and preferred topics of 4-H youth development volunteers. *Journal of Extension*, 47(1), 1RIB2.
- Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice*: Taylor & Francis.
- Goodson, C., & Murnane, L. (2008). *Essentials of fire fighting and fire department operations*: Brady/Prentice Hall Health.
- Graf, F. (2002). Providing security for eLearning. *Computers & Graphics*, 26(2), 355-365.
- Graf, S., Ives, C., Rahman, N., & Ferri, A. (2011). AAT: a tool for accessing and analysing students' behaviour data in learning systemsACM. Symposium conducted at the meeting of the Proceedings of the 1st international conference on learning analytics and knowledge
- Grossman, J. B., & Furano, K. (1999). Making the most of volunteers. *Law and Contemporary problems*, 62(4), 199-218.
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *ECTJ*, 29(2), 75.
- Haag, J. (2011). From elearning to mlearning: the effectiveness of mobile course delivery Symposium conducted at the meeting of the The Interservice/Industry Training, Simulation & Education Conference (I/ITSEC)
- Hadullo, K., Oboko, R., & Omwenga, E. (2018). Factors affecting asynchronous e-learning quality in developing countries university settings. *International Journal of Education and Development using ICT*, 14(1).
- Hamilton, S. E. (2005). Volunteers in disaster response: The American Red Cross. *Journal of Aggression, Maltreatment & Trauma*, 10(1-2), 621-632.
- Hartree, A. (1984). Malcolm Knowles' theory of andragogy: A critique. *International Journal of Lifelong Education*, 3(3), 203-210.
- Hintze, N. R. (2008). *First responder problem solving and decision making in today's asymmetrical environment*. Monterey, California. Naval Postgraduate School.
- Hollow, D. (2013). ICWE.(2009). eLearning in Africa: Challenges, priorities and future direction. Retrieved June, 11.
- Holmgren, R. (2012). Preparations for practical exercises in vocational education: Can ICT-based distance instruction be an alternative to face-to-face instruction? An empirical contribution. *Procedia-Social and Behavioral Sciences*, 46, 1152-1161.
- Holmgren, R. (2014). Reformed firefighter training program in Sweden: conflicting instructor conceptions of professional learning. *Nordic Journal of Vocational Education and Training*, 4(2), 1-14.
- Howe, M. J. (1970). Using students' notes to examine the role of the individual learner in acquiring meaningful subject matter. *The Journal of Educational Research*, 64(2), 61-63.

- Jenkins, M. (2013). *an evaluation of the 'be firewise' programmes for year 7 and 8, and senior secondary school students*.
- Jerin, J. M., & Rea, T. D. (2005). Web-based training for EMT continuing education. *Prehospital emergency care*, 9(3), 333-337.
- Kan, A. (2003). Recruitment and retention of women volunteers within the Fire Service.
- Keegan, D. (2002). The Future of Learning: From eLearning to mLearning.
- Kleinsasser, A. M. (2000). Researchers, reflexivity, and good data: Writing to unlearn. *Theory into practice*, 39(3), 155-162.
- Klingensmith, B. L. (2005). Learning styles of emergency services responders.
- Knowles, M. S. (1972). Motivation in volunteerism: Synopsis of a theory. *Journal of Voluntary Action Research*, 1(2), 27-29.
- Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult education*: San Francisco: Jossey Bass.
- Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2014). *The adult learner: The definitive classic in adult education and human resource development*: Routledge.
- Kobziar, L. N., Rocca, M. E., Dicus, C. A., Hoffman, C., Sugihara, N., Thode, A. E., . . . Morgan, P. (2009). Challenges to educating the next generation of wildland fire professionals in the United States. *Journal of Forestry*, 107(7), 339-345.
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of management learning & education*, 4(2), 193-212.
- Kolb, A. Y., & Kolb, D. A. (2012). Experiential learning theory. In *Encyclopedia of the Sciences of Learning* (pp. 1215-1219): Springer.
- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*: FT press.
- Lambert, V. A., & Lambert, C. E. (2012). Qualitative descriptive research: An acceptable design. *Pacific Rim International Journal of Nursing Research*, 16(4), 255-256.
- Landry, J. M. (2011). *Learning Styles of Law Enforcement Officers: Does Police Work Affect how Officers Learn?* : Capella University.
- Lewis, L. H., & Williams, C. J. (1994). Experiential learning: Past and present. *New directions for adult and continuing education*, 1994(62), 5-16.
- Lincoln, Y. S. (1995). Emerging criteria for quality in qualitative and interpretive research. *Qualitative inquiry*, 1(3), 275-289.
- Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New directions for evaluation*, 1986(30), 73-84.
- Lloyd, A. (2007). Learning to put out the red stuff: Becoming information literate through discursive practice. *The library quarterly*, 77(2), 181-198.
- Lowry, C. M. (1989). Supporting and Facilitating Self-Directed Learning. ERIC Digest No. 93.
- Macduff, N. (1994). Principles of training for volunteers and employees. *The Jossey-Bass handbook of nonprofit leadership and management*, 303-324.
- Mack, L. (2010). The philosophical underpinnings of educational research.
- MacNeela, P. (2008). The give and take of volunteering: Motives, benefits, and personal connections among Irish volunteers. *VOLUNTAS: International journal of voluntary and nonprofit organizations*, 19(2), 125-139.
- Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews Symposium conducted at the meeting of the Forum qualitative Sozialforschung/Forum: qualitative social research

- Maxfield, R. J. (2009). *Asynchronous online learning: perceptions and experiences of nontraditional adult emergency services students*: SelectedWorks.
- McDermott Miller Strategies. (2011). *Changes in community self-reliance and implications for fire safety messages and emergency response*.
- McDonald, B., Cervero, R. M., & Courtenay, B. C. (1999). An ecological perspective of power in transformational learning: A case study of ethical vegans. *Adult Education Quarterly*, 50(1), 5-23.
- McLennan, J. (2005). Recruiting Australia's Rural Fire Services Volunteers: Present and Future Challenges. *Australian Journal on Volunteering*, 10(1), 52.
- McLennan, J., Birch, A., Cowlshaw, S., & Hayes, P. (2008). I quit! Leadership and satisfaction with the volunteer role: Resignations and organizational responses Symposium conducted at the meeting of the Australian Psychological Society Annual Conference, Hobart, Australia
- McLennan, J., Birch, A., Cowlshaw, S., & Hayes, P. (2009). Maintaining volunteer firefighter numbers: Adding value to the retention coin. *Australian Journal of Emergency Management, The*, 24(2), 40.
- Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New directions for adult and continuing education*, 2001(89), 3-14.
- Mezirow, J. (1981). A critical theory of adult learning and education. *Adult education*, 32(1), 3-24.
- Mezirow, J. (1993). A transformation theory of adult learningERIC. Symposium conducted at the meeting of the Adult Education Research Annual Conference Proceedings
- Mezirow, J. (2000). Learning to think like an adult. *Learning as transformation: Critical perspectives on a theory in progress*, 3-33.
- Miettinen, R. (2000). The concept of experiential learning and John Dewey's theory of reflective thought and action. *International Journal of Lifelong Education*, 19(1), 54-72.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis*: Sage.
- Ministry of Education. (2017). *Enabling elearning*. Retrieved from <http://elearning.tki.org.nz>
- Monteiro, S., Lencastre, J. A., Silva, B. D. d., Osório, A. J., de Waal, P., İlin, Ş. Ç., & İlin, G. (2017). A systematic review of design factors to prevent attrition and dropout in e-Learning courses.
- Muirhead, R. J. (2007). E-learning: Is This Teaching at Students or Teaching With Students? *Wiley Online Library*. Symposium conducted at the meeting of the Nursing Forum
- National Fire Protection Association. (2017a). *NFPA 1000, standard for service professional qualifications accreditation and certification systems*: National Fire Protection Association.
- National Fire Protection Association. (2017b). *NFPA 1001, standard for fire fighter professional qualifications*: National Fire Protection Association.
- Neergaard, M. A., Olesen, F., Andersen, R. S., & Sondergaard, J. (2009). Qualitative description—the poor cousin of health research? *BMC medical research methodology*, 9(1), 52.
- Netsafe. (2016). From literacy to fluency to citizenship: digital citizenship in education.
- New Zealand Fire Service Commission. (2016). *Official information request*. Retrieved from <https://fyi.org.nz/request/4967-training-courses-for-firefighters>
- New Zealand Government. (1949). Fire Services Act.

- New Zealand Government. (2017). *Fire and Emergency Act*
- Newbury, B. (2015). Paramedic Hybrid Education Programs Brings Learning Opportunities to Everyone. *Journal of Emergency Medical Services*.
- Nichols, M. (2003). A theory for eLearning. *Educational technology & society*, 6(2), 1-10.
- Nicholson, P. (2007). A history of e-learning. *Computers and education*, 1-11.
- Omoto, A. M., & Snyder, M. (1995). Sustained helping without obligation: motivation, longevity of service, and perceived attitude change among AIDS volunteers. *Journal of personality and social psychology*, 68(4), 671.
- Omoto, A. M., & Snyder, M. (2002). Considerations of community: The context and process of volunteerism. *American Behavioral Scientist*, 45(5), 846-867.
- Pardess, E. (2005). Training and mobilizing volunteers for emergency response and long-term support. *Journal of Aggression, Maltreatment & Trauma*, 10(1-2), 609-620.
- Paton, D. (1994). Disaster relief work: An assessment of training effectiveness. *Journal of Traumatic stress*, 7(2), 275-288.
- Pea, R. D. (2004). The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity. *The journal of the learning sciences*, 13(3), 423-451.
- Pelletier, J. E. (2005). *Bridging the gap between asynchronous and traditional learning environments: Technology for adult learners*: University of New Hampshire.
- Perkins, K. B. (1989). Volunteer firefighters in the United States: A descriptive study. *Nonprofit and Voluntary Sector Quarterly*, 18(3), 269-277.
- Pietrykowski, B. (1996). Knowledge and power in adult education: Beyond Freire and Habermas. *Adult Education Quarterly*, 46(2), 82-97.
- Pratt, D. D. (1988). Andragogy as a relational construct. *Adult Education Quarterly*, 38(3), 160-172.
- Qingyang, G. (2003). Mlearning: A new development towards more flexible and learner-centred learning. *Teaching English with Technology*, 3(2).
- Rabionet, S. E. (2011). How I learned to design and conduct semi-structured interviews: An ongoing and continuous journey. *The Qualitative Report*, 16(2), 563.
- Rahman, M. M., & Hoque, A. M. (2017). Transformative Learning: a Concept and Powerful Vision for Adult Education. *Anwer Khan Modern Medical College Journal*, 8(2), 128-131.
- Raitman, R., Ngo, L., Augar, N., & Zhou, W. (2005). Security in the online e-learning environment/IEEE. Symposium conducted at the meeting of the Advanced Learning Technologies, 2005. ICALT 2005. Fifth IEEE International Conference on
- Robertson, D. L. (1996). Facilitating transformative learning: Attending to the dynamics of the educational helping relationship. *Adult Education Quarterly*, 47(1), 41-53.
- Rossmann, M. H. (2000). Andragogy and distance education: Together in the new millennium. *New Horizons in Adult Education and Human Resource Development*, 14(1), 4-11.
- Ruan, L. J. (2011). *Information-seeking and sharing behaviors among fire service field staff instructors: A qualitative study*. University of Illinois at Urbana-Champaign.
- Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health*, 18(2), 179-183.
- Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description? *Research in nursing and health*, 23(4), 334-340.

- Sanders, J., O'Brien, M., Tennant, M., Sokolowski, S. W., & Salamon, L. M. (2008). The New Zealand non-profit sector in comparative perspective. *Wellington: Office for the Community and Voluntary Sector*.
- Schindler-Rainman, E., & Lippitt, R. (1971). *The Volunteer Community: Creative Use of Human Resources*.
- Sheffield, S. B. (1962). *The orientations of adult continuing learners*. University of Chicago, Department of Education.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22(2), 63-75.
- Sirkemaa, S. J. (2014). Analysing e-learning and modern learning environments. *International Journal of Information and Education Technology*, 4(2), 176.
- Snively, S., Rae, A., & Zechner, A. (2009). *Describing the value of the contribution from the volunteer fire brigade*.
- Snook, J. W., & Olsen, D. C. (2006). *Recruiting, training, and maintaining volunteer fire fighters*: Jones & Bartlett Learning.
- Taber, N. (2008). Emergency response: Elearning for paramedics and firefighters. *Simulation & Gaming*, 39(4), 515-527.
- Tang, F., Morrow-Howell, N., & Choi, E. (2010). Why do older adult volunteers stop volunteering? *Ageing & Society*, 30(5), 859-878.
- Tate, D. L., Sibert, L., & King, T. (1997). Using virtual environments to train firefighters. *IEEE Computer Graphics and Applications*, 17(6), 23-29.
- Thompson, A. M., & Bono, B. A. (1992). Alienation, self-actualization and the motivation for volunteer labor. *Review of radical political economics*, 24(2), 115-123.
- Thompson, A. M., & Bono, B. A. (1993). Work without Wages; the Motivation for Volunteer Firefighters. *American Journal of Economics and Sociology*, 52(3), 323-343.
- Thompson III, A. M., & Bono, B. A. (1993). Work without Wages; the Motivation for Volunteer Firefighters. *American Journal of Economics and Sociology*, 52(3), 323-343.
- Tyler-Smith, K. (2006). Early attrition among first time eLearners: A review of factors that contribute to drop-out, withdrawal and non-completion rates of adult learners undertaking eLearning programmes.
- Useem, M., Cook, J. R., & Sutton, L. (2005). Developing leaders for decision making under stress: Wildland firefighters in the South Canyon Fire and its aftermath. *Academy of management learning & education*, 4(4), 461-485.
- Vince, R. (1998). Behind and beyond Kolb's learning cycle. *Journal of Management Education*, 22(3), 304-319.
- Volunteering New Zealand. (2015). *State of Volunteering in New Zealand Report 2015*.
- Volunteering New Zealand. (2017). *Overview paper on the state of volunteering in New Zealand*.
- Wilkerson, W., Avstreich, D., Gruppen, L., Beier, K. P., & Woolliscroft, J. (2008). Using immersive simulation for training first responders for mass casualty incidents. *Academic emergency medicine*, 15(11), 1152-1159.
- Williams, B., Boyle, M., Molloy, A., Brightwell, R., Munro, G., Service, M., & Brown, T. (2011). Undergraduate paramedic students' attitudes to e-learning: findings from five university programs. *Research in Learning Technology*, 19(2), 89-100.
- Wilson, P. E. (2000). Hospice volunteer training: Making the experience more meaningful. *American Journal of Hospice and Palliative Medicine®*, 17(2), 107-110.

8. Appendices

Appendix A: Request for Participation



Auckland University of Technology
Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999
www.aut.ac.nz

Fire and Emergency New Zealand Email to Potential Student Participants

Kia ora,

You have been invited to participate in a study that will investigate firefighter experiences with the online learning environment and the material contained in the Qualified Firefighter programme e-learning modules.

The research is being conducted by Todd Miller, as part of a Masters in Emergency Management being studied at the Auckland University of Technology (AUT). The research title is:

Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

You have been selected as a potential participant because you are a volunteer firefighter with Fire and Emergency NZ, enrolled in the Qualified Firefighter programme, are 18 years or older, and have completed the e-learning phase of the programme.

Participants will be interviewed, which should take approximately one hour and be conducted at a convenient location (e.g., fire station or a private meeting room in a public space such as a library), at a mutually agreeable time.

If you are interested in participating, please contact Todd and you will receive a Participant Information Sheet which will provide further information about the study and a Consent Form which will need to be completed and returned.

Researcher Contact Details:

Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396 (researcher)

Approved by the Auckland University of Technology Ethics Committee on 31 Jan 18 AUTEK Reference number 18/10

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Email to Potential Trainer Participants

Kia ora,

As you may know, I am studying a Masters degree in Emergency Management with the Auckland University of Technology (AUT). The research is specifically investigating the suitability of e-learning as a part of firefighter training, the barriers and enablers to successfully implement this mode of delivery.

The research title is:

Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

I am looking for several trainers that deliver the QFF programme who would like to participate in an interview of approximately one hour to discuss their perception of the QFF e-learning modules and the impact they have on the student's preparedness for the practical course.

If you are interested in participating, please reply to this email and you will receive a Participant Information Sheet which will provide further information about the study and a Consent Form which will need to be completed and returned.

Researcher Contact Details:

Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396 (researcher)

Appendix B: Participation Information Sheet

Auckland University of Technology
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Participant Information Sheet – Student

Date Information Sheet Produced:

11 January 2018

Project Title

Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

An Invitation

Kia ora, my name is Todd Miller. I am a Trainer and firefighter with Fire and Emergency New Zealand. I am currently completing a Masters in Emergency Management at the Auckland University of Technology (AUT). I am inviting you to participate in a research project I am undertaking as part of this qualification that aims to explore firefighters' perceptions of and possible barriers and enablers to the use of e-learning for training purposes.

What is the purpose of this research?

This research aims to collect information about how e-learning prepares firefighters for practical training, the enablers and barriers to effectively use e-learning and potential strategies to enhance the use of e-learning. This research will benefit you by providing a forum for you to share your perceptions and experiences of the current firefighter e-learning environment.

The wider community will benefit from this research by having firefighters within their community that are provided training that is fit-for-purpose. By having firefighters appropriately trained, they are able to reduce the incidence and consequence of fire and other emergencies in their community.

The findings from this research will be used to produce various outputs, such as a dissertation, research reports, journal articles, and presentations to help guide future policies and training design.

How was I identified and why am I being invited to participate in this research?

You have been invited to participate in this study because you are a volunteer firefighter with Fire and Emergency NZ, enrolled in the Qualified Firefighter programme, are 18 years or older, and have completed the e-learning phase of the programme.

How do I agree to participate in this research?

To participate and be included in this study, you must sign the Consent Form which was sent along with this document. Anyone who chooses not to sign the consent form will not be included in this research.

Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you nor affect your employment as a firefighter with Fire and Emergency NZ. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to be continued to be used. However, once findings have been produced, removal of your data may not be possible. As

What will happen in this research?

This research involves an in-person interview that will be held at a convenient location (e.g., fire station or a private meeting room in a public space such as a library), at a time that is most convenient for you. In this interview, I will ask you a range of questions related to e-learning, access and navigation of the online learning environment and your thoughts of how e-learning can be improved to better fit your needs. With your permission, the interview will be audio-recorded and notes will be taken.

What are the discomforts and risks?

It is not anticipated that you will experience any notable risks or discomfort from your participation in this study.

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AUT

TE WĀNANGA ARONUI
 O TĀMAKI MAKĀU RAU

How will these discomforts and risks be alleviated?

In the very unlikely chance that you experience any discomforts or risk, you have access to Fire and Emergency NZ health and wellbeing counselling service that can be accessed via the communication centre, your volunteer support officer or brigade management.

What are the benefits?

It is anticipated that your comments will provide important insights to guide future policies and training design and in turn, help improve the e-learning experience of firefighters and other first responders in New Zealand. The research findings will also be shared nationally and internationally by producing journal articles and conference papers and presentations. A koha in the form of a voucher will be offered in recognition of your time.

How will my privacy be protected?

If you agree to participate in this research, all of the information you supply during the interview will be held in confidence and your name or any personally identifiable information will not appear in any report or publication of the research. Your input from the interview will be coded to remove any personally identifiable information, safely stored using password protection, and only the researcher will have access to this information. An external storage device with password protection will be used and it will be securely stored and archived for six years at AUT following completion of the study. After the six year retention period, all related information will be permanently deleted from research computers, and any hard copies will be shredded and destroyed. Confidentiality will be provided to the fullest extent possible.

What are the costs of participating in this research?

There is no cost for you to participate in this research. We kindly ask you to participate in an interview that will take approximately one hour of your time.

What opportunity do I have to consider this invitation?

I kindly ask you to consider my invitation to participate in this study and provide a response within two weeks please to the Researcher, Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396

Will I receive feedback on the results of this research?

After the study has finished, we will send a summary report of the findings to the address you have provided if you indicate (on the Consent Form) that you would like a copy of this report.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Researcher, Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, Kate O'Connor, ethics@aut.ac.nz, 09 921 9999 ext 6038.

Whom do I contact for further information about this research?

Researcher Contact Details:

Todd Miller, todd.miller@fireandemergency.nz, +64 21 022 64 396 (researcher)

Supervisor Contact Details:

Dr Nadia Charania, nadia.charania@aut.ac.nz, +64 9 921 9999 Ext 6796

Approved by the Auckland University of Technology Ethics Committee on 31 Jan 18 AUTEC Reference number 18/10

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Participant Information Sheet – Trainer

Date Information Sheet Produced:

11 January 2018

Project Title

Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

An Invitation

Kia ora, my name is Todd Miller. I am a Trainer and firefighter with Fire and Emergency New Zealand. I am currently completing a Masters in Emergency Management at the Auckland University of Technology (AUT). I am inviting you to participate in a research project I am undertaking as part of this qualification that aims to explore firefighters' perceptions of and possible barriers and enablers to the use of e-learning for training purposes.

What is the purpose of this research?

This research aims to collect information about how e-learning prepares firefighters for practical training, the enablers and barriers to effectively use e-learning and potential strategies to enhance the use of e-learning. This research will benefit you by providing a forum for you to share your perceptions and experiences of the current firefighter e-learning environment.

The wider community will benefit from this research by having firefighters within their community that are provided training that is fit-for-purpose. By having firefighters appropriately trained, they are able to reduce the incidence and consequence of fire and other emergencies in their community.

The findings from this research will be used to produce various outputs, such as a dissertation, research reports, journal articles, and presentations to help guide future policies and training design.

How was I identified and why am I being invited to participate in this research?

You have been invited to participate in this study because you are a Trainer with Fire and Emergency NZ, have delivered the practical Qualified Fire fighter course, and are 18 years or older.

How do I agree to participate in this research?

To participate and be included in this study, you must sign the Consent Form which was sent along with this document. Anyone who chooses not to sign the consent form will not be included in this research.

Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you nor affect your employment as a firefighter with Fire and Emergency NZ. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to be continued to be used. However, once findings have been produced, removal of your data may not be possible. As

What will happen in this research?

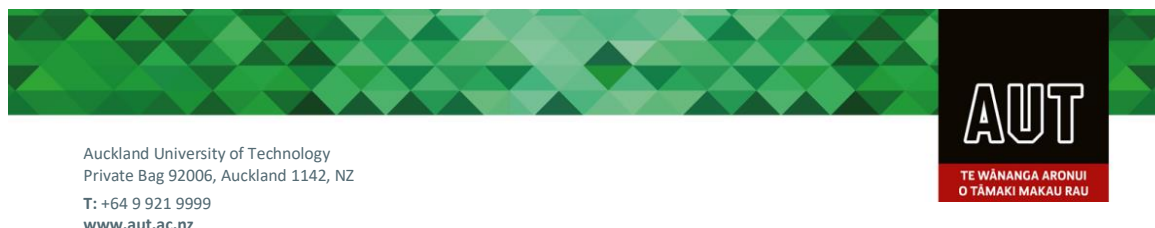
This research involves an in-person interview that will be held at your respective fire station or Training Centre at a time that is most convenient for you. In this interview, I will ask you a range of questions related to students' theoretical knowledge gained from e-learning modules, the students' preparedness for the practical course, your experience of the e-learning environment and modules. With your permission, the interview will be audio-recorded and notes will be taken.

What are the discomforts and risks?

It is not anticipated that you will experience any notable risks or discomfort from your participation in this study.

How will these discomforts and risks be alleviated?

In the very unlikely chance that you experience any discomforts or risk, you have access to Fire and Emergency NZ health and wellbeing counselling service that can be accessed via the communication centre, your volunteer support officer or brigade management.



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What are the benefits?

It is anticipated that your comments will provide important insights to guide future policies and training design and in turn, help improve the e-learning experience of firefighters and other first responders in New Zealand. The research findings will also be shared nationally and internationally by producing journal articles and conference papers and presentations. A koha in the form of a voucher will be offered in recognition of your time.

How will my privacy be protected?

If you agree to participate in this research, all of the information you supply during the interview will be held in confidence and your name or any personally identifiable information will not appear in any report or publication of the research. Your input from the interview will be coded to remove any personally identifiable information, safely stored using password protection, and only the researcher will have access to this information. An external storage device with password protection will be used and it will be securely stored and archived for six years at AUT following completion of the study. After the six year retention period, all related information will be permanently deleted from research computers, and any hard copies will be shredded and destroyed. Confidentiality will be provided to the fullest extent possible.

What are the costs of participating in this research?

There is no cost for you to participate in this research. We kindly ask you to participate in an interview that will take approximately one hour of your time.

What opportunity do I have to consider this invitation?

I kindly ask you to consider my invitation to participate in this study and provide a response within two weeks please to the Researcher, Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396

Will I receive feedback on the results of this research?

After the study has finished, we will send a summary report of the findings to the address you have provided if you indicate (on the Consent Form) that you would like a copy of this report.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Researcher, Todd Miller, todd.miller@fireandemergency.nz, 021 022 64 396

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, 09 921 9999 ext 6038.

Whom do I contact for further information about this research?

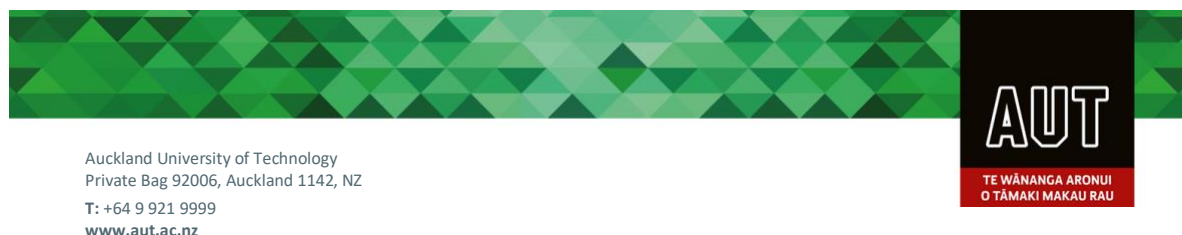
Researcher Contact Details:

Todd Miller, todd.miller@fireandemergency.nz, +64 21 022 64 396 (researcher)

Supervisor Contact Details:

Dr Nadia Charania, nadia.charania@aut.ac.nz, +64 9 921 9999 Ext 6796

Appendix C: Consent Form



Consent Form

Project title: Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

Project Supervisor: Dr Nadia Charania

Researcher: Todd Miller

- ☐ I have read and understood the information provided about this research project in the Information Sheet dated 11 January 2018.
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.
- ☐ I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- ☐ I understand that if I withdraw from the study then I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to be continued to be used. However, once the findings have been produced, removal of my data may not be possible.
- ☐ I agree to take part in this research.
- ☐ I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Participant's signature:

Participant's name:

Participant's Contact Details:
.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on 31 Jan 18 AUTEK Reference number 18/10

Note: The Participant should retain a copy of this form

Appendix D: Interview Questions

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Indicative Questions for Interviews for Students

For use by researcher only

Study Participant Number: _____

Date: _____

Indicative interview questions for the students include:

- ☐ Build rapport
- ☐ Demographic information
 - o Can you please tell me your age?
 - o (Note gender)
 - o Where are you from (what part of NZ or when moved to NZ)?
 - o Ethnicity?
 - o Occupation?
 - o How long have you been with Fire and Emergency NZ?
- 1. **Access:**
 - a. Please tell me about your experience with accessing and navigating through the e-learning modules?
 - i. What was easy/were there any enablers? What was hard/were there any barriers?
 - b. Where did you access the learning station?
 - i. At home or at the fire station?
 - ii. Why this particular location?
 - c. What device did you use?
 - i. Pc/mac/tablet/phone? Personal or FENZ?
 - d. Was there a brigade member that guided you through the modules?
 - i. What was their rank and experience? Had they recently completed the programme themselves?
 - e. Did you know where or how you gained IT or learning support?
 - i. Did you use it?
 - f. Were you able to access and revise the online learning modules?
 - i. Was that easy?
 - ii. Did you do it? How many times?
 - g. Do you have any recommendations to improve the accessibility of the e-learning module?
- 2. **Learning:**
 - a. Please tell me about your experience with learning the content?
 - i. Did you experience any aspects that were easy or enabled your learning with the e-learning module?
 - ii. Did you experience any barriers or challenges with the e-learning module? How did that make you feel?
 - b. If you think back, was there any part of the learning experience that particularly stuck with you? That you can remember now – anything really good or really bad/needs improvement?
 - c. Did you take notes – on the hardcopy study guides or elsewhere? What kind – how did this assist with your learning?
 - d. Please tell me about the amount of information you received. Was it too much? Too little? What information did you find particularly relevant or not so relevant?
 - e. Do you have any recommendations to improve the learning experience and content of the e-learning module?



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3. Preparation:

- a. Please tell me about how prepared you felt for the practical course after completing the e-learning modules.
 - i. Did the e-learning module prepare you for the practical course? In what way did you feel prepared or not?
- b. What areas of the precourse learning were most beneficial to your practical experience and why?
- c. What areas of the precourse learning were the least beneficial to your practical experience and why?
- d. How much of the precourse learning could you remember when attending the practical course?
- e. Do you have any recommendations for how the e-learning module could make you feel more prepared for the practical course?

4. General

- a. What advice would you give a future student based on your experiences? (opportunity for them to reflect on their experiences/lessons learnt and what they would share to an incoming student...)
- b. Can you reflect on your past experiences of learning with Fire and Emergency and compare the e-learning with traditional book based (commonly referred to as “the brick”) distance study?
- c. What aspects make one work better for you over the other?
- d. Are there any aspects from the other (e-learning or book-based) that did work better for you? Why?
- e. What are your thoughts on completing the theoretical learning in class at the training centre rather than before the course via distance education?
- f. Any additional comments or anything else you’d like to share about your experiences with the e-learning module?

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Indicative Questions for Interviews for Trainers

For use by researcher only

Study Participant Number: _____

Date: _____

- ☐ Build rapport
- ☐ Demographic information
 - Can you please tell me your age?
 - (Note gender)
 - Where are you from (what part of NZ or when moved to NZ)?
 - Ethnicity?
 - Occupation? How long have you been a trainer for?
- 1. Please describe your perception of students' theoretical knowledge retention when they arrive at the practical course after completing the e-learning module.
 - a. Do you have to coach the students, or can they recall the information freely?
- 2. To what extent do you feel that the e-learning module prepared students for the practical course?
- 3. Have you accessed and completed the e-learning modules?
 - a. Can you describe your experience?
 - b. How often have you accessed it?
 - c. What was easy/enablers? What was hard/barriers?
 - d. Any recommended changes?
- 4. Is there anything (content or layout/engagement wise) that you consider should be added or removed from the e-learning material?
- 5. Do you have any recommendations for how the e-learning module could be improved to meet the training and learning needs of students, so that they are better prepared for the practical course?
- 6. What are your thoughts on students' knowledge retention if they study via "the brick" rather than online?
- 7. What are your thoughts on students completing the theoretical learning in class at the training centre rather than before the course via distance education?
- 8. Any additional comments or anything else you'd like to share about your perceptions of the e-learning module?

Appendix E: Protocol for Digital Recording

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www.aut.ac.nz



Protocol for Digital and Voice Recording

Date Protocol Produced:

11 January 2018

Project Title:

Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand

Type of Recording

Each interview will be audio recorded using a digital micro-recorder and notes will be taken. The participants are required to give their consent to being audio-recorded to be included in the research.

How will participants be identified in the recordings?

Each participant will be assigned a study participant number by the researcher upon receiving informed written consent to participate in this study. This study participant number will be recorded by the researcher and be stated at the start of the recording.

How will the identities of the participants be protected?

By using a study participant number, the researcher ensures that the identities of the participants will remain confidential.

Who will have access to the recordings?

The involved researcher will have access to the digital audio recordings.

What are the guidelines for safekeeping and/or destroying the recordings?

Audio recordings of all interviews will be deleted upon completion of the study. All transcripts will be securely stored in a locked filing cabinet at AUT for six years. After this time the data will be destroyed in accordance with the AUTEK protocol.

Approved by the Auckland University of Technology Ethics Committee on 31 Jan 18 AUTEK Reference number 18/10

Appendix F: Letter of support from Fire and Emergency New Zealand



Fire and Emergency New Zealand

National Headquarters
Level 12
80 The Terrace
PO Box 2133
Wellington

New Zealand

Phone+64 4 496 3600, Fax +64 4 496 3700

20 December 2017

To whom it may concern

I am writing this letter in support of Todd Miller who is undertaking the MSc Emergency Management at AUT. Fire and Emergency New Zealand is supportive of the research project proposed by Todd and will facilitate access to volunteer firefighters and trainers.

We will contact potential interviewees and Todd will ensure that all data collected as part of the research will be de-identified to protect the identities of participants. We note that the research proposal will undergo an ethics approval process which may place additional requirements on the research.

Yours faithfully

Zoe Mounsey
Senior Research Programme Advisor

Denis Hulston
Manager, Region Training



Appendix G: Ethics Approval

AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics



31 January 2018

Nadia Charania
Faculty of Health and Environmental Sciences

Dear Nadia

Re Ethics Application: **18/10 Enhancing readiness: an exploration of using e-learning to train firefighters in New Zealand**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 31 January 2021.

Standard Conditions of Approval

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: <http://www.aut.ac.nz/researchethics>.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation then you are responsible for obtaining it. You are reminded that it is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

For any enquiries, please contact ethics@aut.ac.nz

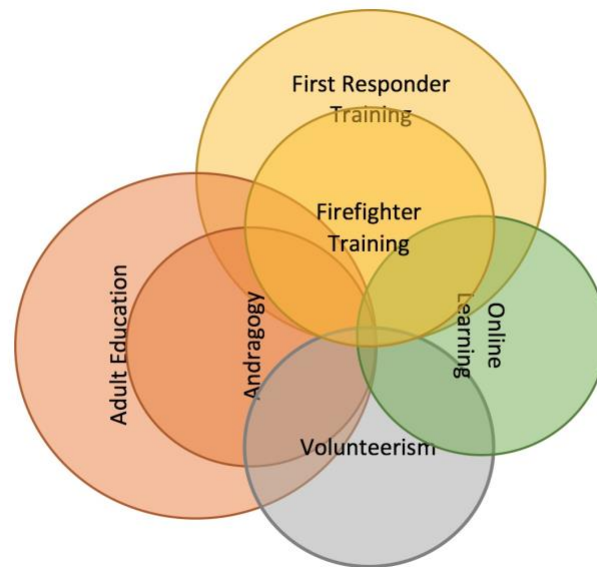
Yours sincerely,



Kate O'Connor
Executive Manager
Auckland University of Technology Ethics Committee

Cc: todd@miller.geek.nz

Appendix H: Venn Diagram; Visualisation for literature review



Appendix I: Brain-storming Mind Maps

