



WHAKARATONGA IWI

FIRE
EMERGENCY

NEW ZEALAND

UNDERSTANDING HOW FIREFIGHTERS ENGAGE WITH LEARNING TECHNOLOGIES

LITMUS

June 2019

Fire and Emergency commissioned this research to deepen Fire and Emergency's understanding of their learners to inform decisions about the future development of learning resources.

Focus groups and in-depth interviews were conducted with 132 firefighters in four career stations, four urban volunteer stations, and three rural volunteer stations around New Zealand.



Fire and Emergency New Zealand Research Report Number 172

ISBN Number 978-1-92-728735-4

ISSN Number 2703-1705

© Copyright Fire and Emergency New Zealand

Citation: LITMUS. (2019). *Understanding how firefighters engage with learning technologies 2019* (Report No. 172). Wellington, NZ: Fire and Emergency New Zealand.

This research was commissioned by Fire and Emergency New Zealand and undertaken by independent researchers. Publication does not indicate Fire and Emergency New Zealand's endorsement of the findings or recommendations.

Copyright ©. Except for the Fire and Emergency New Zealand emblem, this copyright work is licensed under the Creative Commons Attribution 3.0 New Zealand licence. In essence, you are free to copy, distribute and adapt the work, as long as you attribute the work to Fire and Emergency New Zealand and abide by the other licence terms. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/3.0/nz/>. Please note that the Fire and Emergency New Zealand emblem must not be used in any way which infringes any provision of the [Flags, Emblems, and Names Protection Act 1981](#) or would infringe such provision if the relevant use occurred within New Zealand. Attribution to the Fire and Emergency New Zealand should be in written form and not by reproduction of the Fire and Emergency New Zealand emblem.

LITMUS

Understanding how firefighters engage with learning technologies

Prepared for:
Fire and Emergency New Zealand
Whakaratonga Iwi

January 30, 2018

Contents

Abstract	3
Recommendations	4
Research background	5
How do firefighters train?	6
How do firefighters learn best?	8
How does technology fit into the training environment?	18
What are the barriers to digital learning?	24
Appendix A: Participant profile	30
Appendix B: Research method	31

Acknowledgements

We want to thank all the firefighters who welcomed us into their stations and shared their ideas and insights with us.

We want to thank the research team at Fire and Emergency for their support and assistance. We also want to thank the Fire and Emergency staff who conducted this research with us. Their experience and passion for learning was valuable to this project. Lastly, we would like to thank the Project Reference group for their feedback and insights along the process.

Authors

Sandar Duckworth and Carmen Lau

Abstract

This report presents the findings of qualitative research to understand how firefighters engage with technology for learning. Fire and Emergency New Zealand's (Fire and Emergency) investment in training is considerable. The research was conducted to deepen Fire and Emergency's understanding of their learners to inform decisions about the future development of learning resources.

The research was conducted in partnership with Fire and Emergency. Focus groups and in-depth interviews were conducted with 132 firefighters in four career stations, four urban volunteer stations, and three rural volunteer stations around New Zealand (see Appendices A and B).

The research found that firefighters have a strong culture of practical training and digital learning on stations is limited. However, firefighters see value in using digital learning to enhance practical training. They also identified features and benefits of technology that can meet their learning needs. Technology can provide them with up-to-date information, appeal to different learning preferences, allow them to experience situations remotely, and support flexible learning.

Many firefighters are confident in and capable of using technology for day-to-day activities and are open to using technology for learning. However, other learners (mainly older firefighters) do not use technology extensively and would need support. These learners would struggle to use technology to learn independently or train other firefighters.

The research also found that technological resources are insufficient for individual digital learning as stations do not have enough laptops, tablets, projectors, and screens. Furthermore, slow internet speed can deter learners from online materials. Although many firefighters agree that Fire and Emergency's online training management system 'Learning Station' is a rich source of information, the system is underutilised because many firefighters have difficulties logging on and finding information.

Lastly, the research identified potential risks of digital learning. These include a shift from a team-based learning environment to individual learning and the expectation that volunteers should learn in their own time if they can access technology at home.

This research emphasises the need for Fire and Emergency to consider learners' needs and station infrastructure when developing resources.

Recommendations

We have developed two key recommendations based on the research findings.

1. Fire and Emergency needs to design learning resources that reflect firefighters' learning preferences to encourage participation

To meet learners' preferences, Fire and Emergency needs to:

- **Design digital learning that will be used by firefighters to prepare for practical training.** Firefighters see value in working through digital materials as a group before practical training to familiarise themselves with the task.
- **Design content that is engaging for firefighters.** Firefighters are engaged by digital learning materials that are relatable, stimulating, and succinct. They are discouraged by materials that are long-winded and wordy.
- **Design content in a variety of formats.** Firefighters have individual learning preferences and there is no one-size-fits-all approach.
- **Improve the accessibility and usability of Learning Station.** Firefighters provided feedback on login issues and the difficulty of navigation.

2. Fire and Emergency should work with stations to flexibly implement technology-focused learning

Working with stations would enhance the credibility of the design and delivery of training resources. Fire and Emergency needs to consider how to:

- **Acknowledge the constraints of station infrastructure and work to improve availability of technology resources.** The amount and type of technological resources within each station vary. Moreover, there are geographic factors that need to be considered e.g. network coverage.
- **Build the capability of learners.** Ensure support systems are in place for learners who are not as confident with using technology.
- **Build the capability of trainers to deliver training effectively.** Some older trainers are not confident using technology and will need support to deliver training using technology. Learners also find trained trainers more effective.

Research background

Fire and Emergency has a broad range of responsibilities aimed at making communities across New Zealand safer. Their approach follows risk management principles; reducing risk where they can, making sure they are operationally ready, responding to emergency situations, and helping with recovery. All of this means Fire and Emergency needs to have the right people across the organisation with the right skills.

Fire and Emergency takes a blended approach to learning to meet the diverse needs of their 14,000 operational personnel. Learning resources are developed in a variety of mediums including digital, print, and face-to-face. The Training team is increasing its capacity to deliver established resources such as video, e-learning modules, online assessments, e-books, and animated scenarios. It is also increasing its capability to take advantage of emerging learning technologies.

Learning Station is Fire and Emergency's online training management system which is designed to support training for stations and brigades, make better use of their learners' time, and improve learning outcomes. Learning Station contains topic-based, bite-sized, self-paced knowledge refreshers that firefighters can use anytime, anywhere. The online learning modules on Learning Station (the content) are short pieces of learning with interactive knowledge checks and case studies.

To deliver relevant and effective training, Fire and Emergency needs to understand more about their learners. Specifically, Fire and Emergency wanted to understand:

- How confident are firefighters in using the currently available learning tools and technology?
- What combination of learning methods best suits them?
- What technologies do firefighters use to access learning tools and which do they prefer e.g. phone, desktop, tablets?
- Which delivery platforms are most accessible and useful for firefighters?
- What learning environments do they prefer e.g. group or individual, print, digital, face-to face?

How do firefighters train?

Training is structured around TAPS, OSM, and unit standards

In career and urban volunteer stations, the Training and Progression System¹ (TAPS) and Operational Skills Maintenance² (OSM) structures learning. Training in rural volunteer stations is structured around unit standards (managed by the New Zealand Qualifications Authority).

Aside from TAPS, OSM, and unit standards, training may be conducted on:

- observed behaviours during call-outs that require improvement
- what recruits or firefighters qualifying for the next rank need to learn
- what a returning firefighter learned at the National Training Centre, Regional Training Centre, or a specialist course
- scenarios or skills relevant to call-outs
- what is prescribed by a national roll-out (e.g. new legislation, changes to Fire and Emergency's safety procedures, or the release of new equipment).

Career firefighters train on shift

Career stations conduct training on shift. A high-ranking firefighter (usually the Station Officer or Senior Station Officer) plans and coordinates training for each watch. It is not standard practice for career firefighters to train in their own time unless they choose to on night shifts.

At one career station, we spoke to a Senior Station Officer who has observed training across watches. He noted that training varies depending on the Station Officer or Senior Station Officer in charge. In some watches, a specific amount of time is allocated for training (e.g. one hour of practical training per shift). Some watches take as much time as they need. Other watches do not allocate enough time and are behind on their OSM and TAPS.

Aside from training, career firefighters have other station commitments during their shift which can affect how much time is available for learning. A typical day shift includes appliance checks, gym, checking smoke alarms, lunch and breaks, and call-outs. Shifts can also include public education at schools, tending to volunteer stations who do not have

¹ TAPS is comprised of structured programmes which allow firefighters to progress through Fire and Emergency's rank structure.

² OSM ensures firefighters maintain a set of crucial operational skills. OSM operates as a traffic light system where firefighters have to refresh on skills that are 'red' or 'orange.'

enough people available, delivering training at volunteer stations, checking fire safety systems in hospitals, and attending longer call-outs due to severe weather events.

Volunteer firefighters train on training nights

Training in urban and rural volunteer stations occurs on regular training nights. They last between one and a half to two hours. In urban volunteer stations, this may be weekly. In rural stations, this could be fortnightly, monthly, or less often. Volunteers might also attend courses on the weekend or spend extra time catching up with training they have missed. A few firefighters we spoke to sought out information to learn in their own time but this was not common.

The Chief Fire Officer, the Station Training Coordinator, or the highest-ranking officer on station is usually responsible for training. In some volunteer stations, a training committee supports the planning and management of training. Staff plan training anywhere from six weeks to six months in advance.

Several chiefs commented that people's availability limits training. Regularly attending training nights is difficult for many volunteers who have work and family commitments. It is also difficult for shift and seasonal workers to consistently attend training nights. In one rural station we visited, the farmers we spoke to noted that they are too busy with work to train between August and September.

'Family first, work second, brigade third.'

(Urban volunteer station)

'Only so much training can be done in a 52-week year. You might only get 30 weeks because there are lots of other things happening.'

(Rural volunteer station)

How do firefighters learn best?

To understand how firefighters engage with learning technologies, we first examined how firefighters learn best. We identified aspects of their current training environment that are enjoyable and engaging. We also identified what learners need to learn effectively.

Firefighters learn best from practical training

Firefighters learn best when undertaking practical, hands-on training. They tend to describe themselves as kinaesthetic learners in that they learn by doing. The importance of practical training was a strong and consistent theme across all focus groups and interviews.

‘Most people drawn to the job are **practical-based** people.’ (Career station)

‘You need **hands-on**. We can have all the books and videos you want but you can’t beat hands-on.’ (Rural volunteer station)

‘As farmers, **this is what we do**. We’re practical people. There’s not one person in this brigade that’s an office person.’ (Rural volunteer station)

Practical training is most effective as a significant portion of what happens at a call-out is practical work. It is therefore important to firefighters that training should prepare them for the job.

‘Practical heeds to **something we all actually have to do on our job**. The tactile part of it is much easier to replicate than learning based on written instructions somewhere. We develop muscle memory by drilling. It’s such a physical job, we have to practice it in the physical world.’ (Career station)

‘The reality of our work is that it’s a physical job. It’s about physical performance and **how the person acts and reacts at the time**. A book or a computer is not going to tell you that.’ (Urban volunteer station)

Many firefighters believe it is difficult to capture the nuances of practical training by text, video, or even observation. Learners believe the best way to learn how to use equipment and carry out procedures is to do it physically. Moreover, firefighters think that the tactile and active aspects of practical tasks is what makes it enjoyable.

‘With all training, there are **subtle nuances** that you don’t get from a book. We wouldn’t be able to fully understand how to do something if we’re just reading about equipment and technique and tools. It needs to be applied.’ (Career station)

Firefighters learn as a team

Firefighters learn best as a team. Teamwork is ingrained in the firefighting culture as teamwork is crucial while at a call-out. This is when the group needs to rely on and trust each other. Training as a team allows firefighters to learn how they work best together and what each other's capabilities are. As team players, teamwork also makes training enjoyable.

'Having a good team makes training **fun**.' (Rural volunteer station)

'My personal preference is as a team so when we go to a job, **we work as a team** and not as individuals.' (Urban volunteer station)

Training on station tends to be conducted in a group. During practical training, firefighters learn and play to each other's strengths. Everyone has different ideas for how things work so it is advantageous for the team to try different ways of doing things. Firefighters also work through digital learning materials (e.g. OSM quizzes and Learning Station) as a group. They pause during videos to have discussions and work through quizzes together.

Firefighters teach and help each other

Across all stations, experienced firefighters mentor and guide new recruits. In one volunteer station we visited, a recruit is mentored by an experienced firefighter for their first seven weeks on station. Firefighters also support those with learning difficulties or literacy issues where possible. Digitally savvy learners help those who are less confident with computers.

'Everyone here **cares** about each other.' (Urban volunteer station)

'We do group learning to support those who can't read or write. **We're all in it together**.' (Urban volunteer station)

When a firefighter is working towards a component of TAPS, training is structured around what they need and their team members train alongside them. Firefighters who return from offsite courses demonstrate what they learned to their team. They teach the crew something new or confirm what they have been doing is best practice.

Teamwork extends beyond the station

Firefighters enjoy training with other stations as they learn from each other's perspectives, experiences, and strengths. For example, career firefighters sometimes deliver training to volunteer stations in their area. Urban volunteers may travel to career stations to train and use their resources. Volunteer stations sometimes join up with other stations and train together.

'We enjoy training with them. They get 100 call-outs a year compared to our ten. They've seen more things than we have so it's good to get a **different perspective**.'

(Rural volunteer station)

One station noted the benefits of collaborating with St John.³ Training together prepares the group for working together at a job. Each organisation also brings their specialised knowledge to the table. These firefighters thought working with St John was an asset. St John had briefed them on medical processes (e.g. using a stretcher) before they conducted a scenario and provided them with first-aid resources.

'It's good if you've trained with the people at St John before. **You'd know them when you join up for a big job**. You know their backgrounds.'

(Urban volunteer station)

³ An organisation that provides ambulance services, first-aid training, and other medical services in New Zealand

Firefighters need relevant training

Firefighters are motivated when they learn information they can eventually apply. Applied learning is realistic, relevant to their role, and fit-for-purpose.

Training needs to be realistic and relevant to their role

Firefighters learn well if they know how, where, and when their knowledge will apply to their role. It is important to ground what firefighters learn (especially theory) to the real world.

'We learn better when we know how everything's linked and how it's related and how you can use it. It makes sense if you can see **the bigger picture.**' (Career station)

'Keep training relevant to the job, so it stays in **context.** This makes it fun.' (Urban volunteer station)

Firefighters enjoy learning information that aligns with the type of call-outs they attend. This allows them to see a purpose to their training. Many stations would therefore design practical training or scenarios around common call-outs. In contrast, learners feel less motivated towards training that would be rarely used.

'Practical puts knowledge into perspective. The swift water rescue training was good. Swift water was part of a training package that was put out because it was an indicated problem in our area. The station enjoyed it because **they understood the risk in our district.**' (Career station)

'**Each brigade has different types of calls.** A few years ago, it was all car accidents. Now it's medicals. We need to look at individual brigades and individual training.' (Urban volunteer station)

Volunteer firefighters enjoy scenario-based practical training. Stations set up training scenarios (e.g. motor vehicle accidents) that are most relevant to their call-outs. Station members then attend to the scenario as they would during an incident. Trainers and learners believe this type of training keeps learning in perspective.

'We used to go to different locations like the quarry or the school. **We were learning the different areas we might go to on a job.**' (Rural volunteer station)

In contrast, volunteers from a rural station noted that they do not engage with some digital learning materials because they are not relevant to their work.

'Screen learning is very urban or metro-based. A video would show multiple fire engines turning up to a scene and then it explains the scenario. We only have two fire engines here. It's not relatable and this is an issue with the training. We're all looking at it going "**we know that is not going to work.**"' (Rural volunteer station)

Training materials need to be fit-for-purpose

Firefighters distinguish two reasons for information-seeking – to learn something thoroughly and to refresh their memory. Materials need to be designed to meet one of these purposes.

'When we want to **find** information urgently, we need to find it quickly and see a simple answer. We can't have complicated information. When we want to **learn**, then it needs to expand to show us how to do it properly. If we want to learn, we can't just look at a diagram; we need to see a video or be given practical instruction.' (Career station)

Firefighters need comprehensive information to learn something thoroughly. Detailed information is needed when learning new procedures, learning about new equipment, or preparing for exams or assessment. Firefighters prefer receiving this information in a variety of formats (e.g. practical, video) in small digestible chunks. They find text-heavy documents disengaging.

Firefighters need refreshers for jogging their memory. Refreshers are needed when firefighters prepare for practical training or call-outs. They work best if they are succinct and to the point. Firefighters find bullet-pointed information, diagrams, and flowcharts easier to process.

'If we've already done the course, we just want a **refresher**. We don't want to go through the whole course again. Bullet points are enough.' (Rural volunteer station)

Firefighters from one rural volunteer station praised flip-card books from St John. The cards contain brief notes on how to carry out first-aid procedures. They serve as quick reminders to jog their memory, and they are conveniently kept on station and on the truck.

Firefighters need varied and stimulating training

Firefighters need training that is varied and stimulating. Variety keeps firefighters focussed which maximises effective learning.

'People don't want to come to training week after week to go to the same location and do the same old stuff. People get **sick** of it. It gets **tired** very quickly.' (Urban volunteer station)

'If it's boring, you're going to **lose me** straight away.' (Urban volunteer station)

Stimulating training is particularly crucial for volunteers because they train at night when they are usually exhausted from work. Furthermore, enjoyable training keeps volunteer firefighters motivated between call-outs.

'We train on Tuesday evening after work at 6 pm. We're often tired and it makes it **harder to learn.**' (Urban volunteer station)

'Make training enjoyable so it gives people something to **look forward** to at the end of the day.' (Rural volunteer station)

Many trainers try to avoid repetition to keep training interesting. One urban volunteer station we visited designs training in two-month blocks. Each block covers a different theme so new topics are continuously introduced. Other stations enjoy working through different scenario every week.

Firefighters enjoy a change in environment

Many firefighters enjoy attending offsite courses as it provides a different learning experience. Firefighters learn new material and are exposed to new resources. The training structure is also different as firefighters spend multiple days immersed in a course. They experience a different training style and training culture. However, offsite training is not suitable for everyone, particularly those with young families, work commitments, or limited resources.

'I went on a training development course. It was good being in that environment for **the whole week.** I haven't done this type of training before.' (Career station)

'We don't have many going away for courses. There's an issue of **funds and reality.**' (Urban volunteer station)

Changing the environment keeps learning interesting. Many volunteer stations find scenario-based training in different locations effective. Stations mentioned conducting scenarios at a school, quarry, mill, meat works factory, on the farm, and at a station member's house.

Firefighters value different experiences and perspectives

Learners find stories from outside trainers engaging. Learners enjoy hearing about the different call-outs and experiences of other firefighters, especially in other parts of the country. Learners think stories add value to the material they are learning. Trainers believe, without an outside voice, the group becomes limited in what they think and do.

Firefighters actively seek out information on different experiences. Many firefighters go on YouTube to look at training in other countries. They search for videos on fires in America or international competitions for firefighters. Firefighters find different ways of working fascinating even if the material is not directly applicable to New Zealand.

'It's **different** and makes you want to do it.' (Rural volunteer station)

Firefighters need engaging presenters and trainers

Firefighters learn best from good presenters and trainers. Learners like presenters who are engaging and have presence, control, good communication, and ample knowledge.

'Whether on TV or as a presentation, the **quality** of the presenter is important.'
(Urban volunteer station)

Learners praise the quality and expertise of regional trainers (from Fire and Emergency) and external trainers. Since they are professional trainers, learners feel this training is structured and delivered well. The training is also thorough and covers everything they need to know. Many learners express a desire for more of this type of training.

Learners agree that poor delivery can be disengaging. A poor presenter, who appears uninterested in the material or is not confident, makes it harder to learn. If the material is delivered poorly (e.g. in a monotone manner), learners quickly lose focus. If the material is too long and unstructured, learners find it hard to follow.

'[The presenter] went too far and lost everyone. I felt my eyes **glaze over**.' (Career station)

Many learners commented that trainers on station might not be the best person for training. Trainers are expected to teach skills and subject matter to a high level but may not know how to deliver training effectively. Both trainers and learners believe that trainers need more support and instruction on how to conduct training effectively.

'We **rely** on people who haven't been trained to be trainers.' (Urban volunteer station)

'As trainers, we're **let down**. We try to keep ourselves up to speed but we're not getting the support we need.' (Urban volunteer station)

Some firefighters want flexibility

Some firefighters want the opportunity to learn in their own time. Some are self-driven and have a learning mindset. Some firefighters are self-employed (e.g. farmers) and want to learn in their own time so day-long courses can be cut shorter. Shift workers and seasonal workers want the option to catch up on learning if they cannot attend a training night.

'Some firefighters are self-motivated and **like being busy**. They ultimately want to progress so they're looking at where they want to go within their career.' (Career station)

Some firefighters want to be able to work in their own space. This is particularly the case for bookwork and online learning. Some learners feel constrained sitting at a desk and would rather study somewhere else e.g. at the coffee table or the beach. One firefighter noted if they worked in their own space, other team members could not jump in with the answer.

Some firefighters also want the opportunity to learn at their own pace. They can adjust their learning to their own needs and schedules. For example, some learners need frequent breaks and others want a block of time for dedicated study. Learners also take different lengths of time to understand the material fully.

'I want to learn on my **own terms**, in my pace.' (Urban volunteer station)

Some firefighters have learning disabilities and literacy difficulties

Firefighters with learning disabilities or difficulties with literacy benefit from having multiple formats available. Most individuals with learning disabilities we spoke to have dyslexia.⁴ These learners struggle with literacy and cannot learn effectively with text-heavy and wordy documents. These learners can learn effectively if materials are delivered in alternative formats to text.

Stations do their best to help individuals with learning difficulties. When text is involved, they get one-on-one support or text is read out loud. If they need to write something for an assessment, a station member will be their scribe.

'One of the guys here is dyslexic. **We got him through the books.** I didn't show him the brick. I think that's the biggest failure. I got the first book out, showed him the must-knows and the nice-to-knows. I told him he didn't have to recite the book. I'll just read it to him and teach him.' (Urban volunteer station)

⁴ This is based on a demographics form completed by participants. However, we recognise it is likely that many learning disabilities are undiagnosed.

How does technology fit into the training environment?

Fire and Emergency delivers a blended approach to training to meet the needs of their diverse personnel. The organisation wants to understand the acceptability of technology for training purposes.

To understand how digital learning is received, we investigated the current landscape of digital learning on stations. We also explored whether firefighters are willing to incorporate technology into their training and how they see technology enhancing their learning.

Digital learning is not common on stations

Across all stations, training tends to be practical. Digital learning is not consistent nor is it seen as a priority. However, all stations believe that digital resources will be used more often in the future.

'Learning Station is reasonably new and **it has not become part of our culture yet**. I can see that it could be a good thing in the future.' (Career station)

Learners do not feel they are encouraged or supported to use Learning Station. Some learners would feel obligated to access Learning Station if modules were given as homework. Others, especially volunteers, do not want a higher workload.

'We've **never been encouraged** to use Learning Station or Firenet. I've never been on. It's not something we're required to do so I haven't engaged with it. If it was part of a requirement then I would.' (Urban volunteer station)

'We're **lucky** if we can get 10% of our people using Learning Station.' (Urban volunteer station)

Both career and urban volunteer firefighters recall completing compulsory modules on Learning Station. These include modules on water safety, breathing apparatus, and electricity. Both types of stations also recall watching and discussing case studies.

In career stations, firefighters report working through digital materials together for OSM quizzes. Firefighters might also choose to access TAPS modules on Learning Station during night shifts. It is not usual practice to allocate time for digital learning during daytime shifts.

In urban volunteer stations, Learning Station is used infrequently on training nights. Learning Station is usually only used when a regional trainer uses the system to deliver training. Some learners might access Learning Station to complete required material for TAPS.

In rural volunteer stations, digital learning is rare. Two rural stations we visited received technological resources for training in the past six months. Aside from practical training, an external trainer may deliver classroom-style learning for unit standards. These sessions involve a whiteboard, screen and projector (which the trainer brings), and paper hand-outs. Many rural firefighters feel that digital learning complements practical learning and they would use it when it becomes available.

Many firefighters believe that a combination of practical and digital learning is effective

Many firefighters believe they learn most effectively when practical training and digital learning is combined. There was strong agreement that digital learning cannot replace practical training but instead, practical training can be enhanced by digital learning.

Many firefighters believe learning is most effective when the group first works through digital learning materials together before doing the practical. This process familiarises the learners with what they are physically about to do and sets expectations. The practical afterwards consolidates the learning.

'It is good for online materials to complement the practical course. We would get more out of the course as we're not going into the course blind. We're going in with information that will **help us participate more** as we have the knowledge.' (Rural volunteer station)

'We acquired a thermal camera recently. We saw an online video about it which was really informative. Then we used the camera and saw it work in real life. The combination of theory and practical here was really great. We saw a **physical confirmation** of what was said in the video.' (Urban volunteer station)

Technology can enhance firefighters' learning

Firefighters believe that technology can enhance their learning. We invited firefighters to share memorable learning experiences they have had with digital learning. We also showed them eight digital formats to stimulate discussion. These materials are used in training or are in development. They included video, e-learning, simulation, animation, Flipbook, interactive video, voice assistant, and virtual assistant (see Appendix B).

The following outlines firefighters' perceptions of the benefits and features of digital learning.

Technology can provide up-to-date information

Many firefighters believe digital learning would ensure they are up-to-date with the latest theory and practice. Firefighters are currently updated on changes to standard practice when there is a national roll-out. Otherwise, stations only know when something has changed when a team member has attended a course at the National Training Centre and does things differently. These changes then filter slowly to everyone through word of mouth.

'Since we're an isolated station, we have different ideas of what best practice is. Online resources can show and **reinforce acceptable process.**' (Urban volunteer station)

'If something new happens, it only happens at the National Training Centre. At the moment, everyone has different ideas on what should be done because people aren't updated. **We only know when a rookie comes through.** Training would be more effective if everyone's on the same page.' (Career station)

Technology can appeal to different learning preferences, particularly visual

Many learners, regardless of their confidence and abilities, found the visual components of the digital learning materials engaging. They felt that video and other materials that use video (e.g. virtual assistant) are good examples of visual learning. They also spoke positively about the use of photos in e-learning, and thought animation and simulation are good ways to visualise how a scenario unfolds.

'We're visual and practical rather than theoretical. We need to **see ourselves** being able to do that or see someone else do it. If we get told about it, we're not taking it in.' (Career station)

'The easiest ones for me to learn on Learning Station are **as close to practical as possible**, so I like videos. If it's just text, I am lost as to what someone is talking about.' (Career station)

Although one format might be useful for some learners, it can be disengaging for others. For example, some learners thought the animation was a great way to visualise learning, whereas others thought it was too unrealistic and boring. Some found Flipbook useful while others preferred a physical book. Therefore, to meet all learners' preferences, learning materials should be available in multiple formats.

'Everybody's **different** and learn in different ways. Some like bookwork, others don't.'
(Urban volunteer station)

Technology allows firefighters to experience situations remotely

Firefighters spoke positively about case studies on Learning Station. Case studies refer to videos of real events that firefighters attended to in New Zealand. They found case studies memorable and relatable because they were based on real life events.

'Real life events carry more **weight**.' (Career station)

'The chicken house example was good. We went through what went wrong and what started to go wrong. You know the case studies are good because you can remember the training night. It was **unique and engaging**.' (Urban volunteer station)

'After watching Racetech, I was **looking for** BA tallies on the board every time it came on the news.' (Urban volunteer station)

Similarly, a few firefighters feel that simulations and animations lacked realism. They regarded them as 'cartoony,' 'cheesy,' and difficult to take seriously. These firefighters commented that they would appreciate these tools if they were more realistic.

Technology can support flexible learning

Many firefighters believe that using technology for learning would make learning more convenient. With portable infrastructure and resources (laptop, tablet, and phone), learners could learn in their own time, space, and pace.

'With technology, we can go off by ourselves and **have the option** of learning in our own time. We can catch up if we can't make it to a training night. We can move in different directions to each other.' (Rural volunteer station)

Volunteers from two focus groups saw the value of doing digital learning at home before attending practical training. This would reduce the amount of theory they have to learn on training nights when they are exhausted from work. For self-employed farmers, this is because they want to shorten training nights or courses by separating the theory component.

'I would like to be able to do some of the theory online before coming here for the practical. This can **cut time down a bit** and lets us get it out of the way first. This

saves us having to employ someone to cover us since we're mostly self-employed. I think this would suit most people here.' (Rural volunteer station)

Firefighters noted that technology could accommodate people with learning disabilities and literacy difficulties. These learners struggle with wordy documents. Having information in other formats, such as video, would enable these individuals to learn independently.

'I struggle to read and write so I find watching something far **easier**.' (Rural volunteer station)

What are the barriers to digital learning?

Fire and Emergency wants to understand firefighters' accessibility to technology for training. Through our focus groups, we identified some barriers that might limit access to digital learning. These span from personal resourcefulness (e.g. capability to use technology) to the technological infrastructure.

A few firefighters also identified some risks of increasing the use of technology for training.

Some firefighters are more confident and capable with technology than others

Many firefighters are already using technology in their work, study, and personal lives. They are therefore confident and capable of using technology for learning. This is especially the case for younger firefighters who grew up with technology.

However, a few learners (mainly older firefighters) do not use technology extensively. These individuals would struggle to use technology to learn if they were required to learn independently.

Those who are digitally savvy are happy to support less confident learners to use technology when needed. While some trainers are confident training using technology, other trainers would need instruction on how to teach using technology.

'I've personally had to help some of the older guys, even to just use SMS.⁵ They didn't know how to log in, **let alone get to that stuff.**' (Urban volunteer station)

'Quite honestly, for the younger ones, technology is a **piece of cake**. But for the older ones, that's where the younger ones can be of **assistance** to us. It'll turn things around. We're helping them in training, but they can help in training as well. There are some **real computer whizzes.**' (Urban volunteer station)

Only a few learners we spoke with were 'anti-technology.' This view can have a profound impact on whether a station adopts digital learning, especially if this person is in a leadership role.

⁵ The incident reporting system at Fire and Emergency

Resources for digital learning are insufficient

Most stations do not have enough technological resources (e.g. laptops, tablets, projectors, and screens) for digital learning. The resources available are usually used by senior staff for management and administration purposes.

'We need **more resources**. If we're going to talk about training, it has to start here. More resources.' (Urban volunteer station)

Where trainers use technology for learning, they plug a computer into a television or projector and people learn as a group. This arrangement is adequate for group learning but insufficient for individual learning. If learners want to access digital materials outside of group learning, they need to ask a senior staff member or use their own devices. Learners with lower confidence or fewer personal resources are less likely to access digital learning.

Moreover, resources sometimes do not work as intended which also prevents access to digital learning. Some stations noted that hardware might not always function due to technical issues that they do not know how to resolve. Some firefighters noted that, although some digital technologies (e.g. interactive video, animation) are appealing, they would not be used due to slow computers.

'When we do training in front of the screen, most of the night is full of **technological hiccups**.' (Urban volunteer station)

'We have to put up with the **slowness** of the Fire and Emergency network. It does my head in how long it takes to log in. I enter my details and then I leave to get a glass of water while I wait for it to load. It puts me off.' (Urban volunteer station)

Before amalgamation to Fire and Emergency, rural volunteer stations had few technological devices for learning. External trainers brought equipment with them if the technology was needed. As part of the organisation's Integration Phase, Fire and Emergency are remedying the lack of technological resources in rural volunteer stations. These stations are in the process of receiving tablets and other equipment.

Other essential resources are often unavailable. Pens and paper are absent or limited across stations. One rural volunteer location we visited did not have a station and training was conducted around a brigade member's dining table.

Slow internet connectivity deters learners

Internet speed is inadequate in many career and volunteer stations to support digital learning. Slow internet connectivity impacts productivity. It is especially detrimental to volunteer stations because training is limited to the number of training nights per year.

Trainers find it embarrassing when a laggy connection hinders training as learners quickly lose interest. Learners and trainers experience frequent buffering when streaming multimedia (especially videos) on Learning Station.

'It's especially **embarrassing** if we go into the training room and we have this big screen set up and the guys are all prepared. You go and play a video and it stops a minute into it. You lose your audience.' (Career station)

'I would be standing in the middle of the station and still have to use **my data** to bring up a YouTube video' (Urban volunteer station)

Although many firefighters have access to internet at home and on station, some firefighters do not. Rural stations in isolated areas are usually out of coverage and struggle to connect to the internet. One career station we visited did not have Wi-Fi on station. Another career station we visited also had slow connectivity despite being in a metropolitan area.

'The internet connection is fine here. Once we're out of here, we have issues. A lot of this area is **out of coverage**. On 90% of our roads, we do not have any cellular communication.' (Urban volunteer station)

Learning Station is not user-friendly and therefore underutilised

Many learners agree that Learning Station is a valuable resource for learning. However, many are reluctant to use Learning Station because it is not user-friendly. Firefighters noted instances of individuals being discouraged from using Learning Station after a negative experience. As a result, many firefighters resort to YouTube because information is more accessible.

'To use Learning Station, you need to spend time and **muddle** your way through it. Some people don't have the time or luxury to do that, so it's just put in the "too hard" basket.' (Career station)

'If [Learning Station] was a good product then we'll use it. But it **isn't** currently.' (Urban volunteer station)

Logging on is frustrating

Many learners do not use Learning Station because they have trouble logging on. It often takes multiple attempts and sometimes, it does not work. The inability to log on quickly is frustrating for learners. It is especially unlikely for someone who is not confident with technology to successfully log on.

'To log on to Learning Station at home, it's something like **124 pushes** to get in. You log your name, Fire and Emergency, password. Then you get to the next stage, and you do it again, and then the next stage and you do it again. It's **demotivating**.' (Urban volunteer station)

'If I go to check emails, I have to log in to the homepage. I get to emails, need to log in again. You can't use your email address because it doesn't work. You might use an old login and use a new password. Then you get in **sometimes**.' (Urban volunteer station)

Navigation is not intuitive

Learners get frustrated when they search for information on Learning Station. When they enter a search term, all information related to the word appears in no specific order. This makes searching for information inefficient and laborious.

'The search box isn't as easy as it should be. You might just want a definition but you **end up with pages** of legislation with that word in.' (Urban volunteer station)

'When we're searching for something on Firenet, everything comes up and in a random order. **We can't find anything**. It's not simple to use so we might not bother to access it or lose interest because of this.' (Career station)

A few firefighters are concerned about aspects of digital learning

A few volunteer firefighters are worried that introducing digital learning could change the nature of how firefighters learn. They feel if learners can access technology at home, there might be an expectation that firefighters should start learning in their own time. This change is an issue for volunteers who are already giving their time to attend training nights.

'We are volunteers. We all have a life. We have a work life. We got a family life. We must not get **overloaded** with learning.' (Rural volunteer station)

A few firefighters are concerned that digital learning could change the current training culture. They feel digital learning could shift learning from a team-based learning environment to individual-based learning. This shift would undermine the unique way firefighters learn together.

'You're potentially losing the teamwork because you're not working as a team. You're **individually** looking at a screen.' (Urban volunteer station)

We believe these concerns should be strongly considered when developing learning materials.

Appendix A: Participant profile

We captured a range of individual characteristics that can affect learning. This includes gender, ethnicity, age, level of educational attainment, learning disabilities, and prior experience with e-learning.

We spoke to a total of 132 learners. 81% were male. Moreover, 76% were Pākehā, 18% were Māori, and 3% were Pasifika. The age range spanned from 15 to 71, with an average of 41 years. 30% of our sample obtained a trade certificate, 26% achieved NCEA, 20% attended a polytechnic, 10% achieved an undergraduate degree, 8% did not complete secondary school, and 6% obtained a postgraduate degree.

We were unable to quantify the number of learners with learning disabilities or had prior negative experiences with technology. However, how both factors affected learning arose from our discussions.

Appendix B: Research method

We conducted this research in partnership with Fire and Emergency

This research project followed a co-creation process. The primary goal of pursuing a co-creation process was to share resources across the two organisations because of the project's size. Co-creation also gave Fire and Emergency personnel exposure to learners' needs and the research process.

Fire and Emergency managed the selection and recruitment of stations. Litmus and Fire and Emergency facilitated focus groups and interviews and participated in sense-making workshops. Litmus led the development of the research tools and prepared this report.

Litmus conducted an eight-hour focus group training workshop with six Fire and Emergency personnel in preparation for fieldwork.

Fire and Emergency established a Project Reference Group to oversee the research. The group consisted of stakeholders from training. They provided input into the research plan, reviewed the draft report, and considered implications of the findings.

We developed a research plan

We conducted seven key informant interviews to understand the learning context. We also conducted a desktop review of key documents. We used this information to design the research plan. The plan documented the research questions, sample, method, a preliminary focus group guide, and considerations of the research.

We conducted interviews with senior firefighters

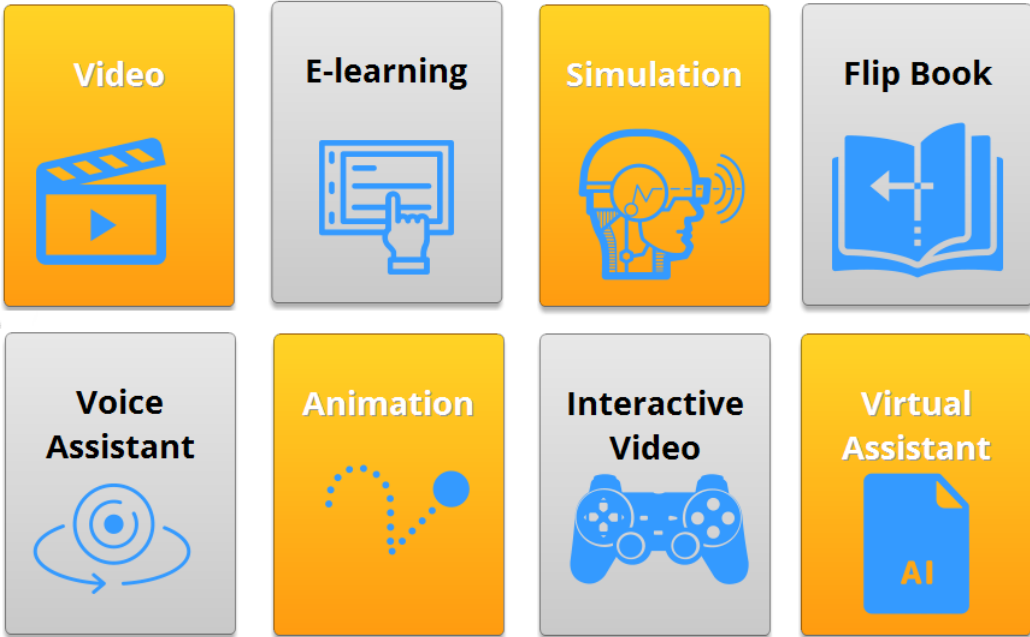
Before each focus group, we conducted separate interviews with the officer in charge (usually a Station Officer or Chief) to understand the training environment. Interviews covered whether they trained on station or at home, as a group or alone, in print, digital, or face-to-face format, how much time is spent on training, and who structures training.

We conducted focus groups with learners

We examined what made firefighters' learning experiences enjoyable and what enabled them to learn effectively. We explored their confidence and experiences with digital learning, what value technology can bring to their learning, and challenges with using technology. Focus groups were conducted on training nights at volunteer stations and during shifts at career stations. Groups were 60 to 90 minutes long.

We showcased examples of digital technologies

At the end of each focus group, we demonstrated eight digital learning materials that are currently being used for training or are in development. These came in the form of a programme where clicking on each module would bring up a short video or demonstration of how the technology worked. A facilitator from Fire and Emergency went through these with the group.



To gather individual opinions of the digital technologies, we asked participants to jot down their impressions individually on a form. In some stations, we opened it up to discussion among learners instead. This was dependent on the circumstances, e.g. how they tended to work together or what they were comfortable with.

We recruited a purposeful sample

We recruited a purposeful sample that captures a range of learning experiences. We went to different areas to explore how learning is affected by accessibility and deprivation, diversity, geographic isolation, and frequency of call-outs. We ran focus groups in different types of stations because career, urban volunteer, and rural volunteer firefighters undergo different training and experience different barriers.

We spoke to a total of **132** learners across four regions. As set out below, around one half of participants were urban volunteers.

	Northland	Waikato/ Coromandel	Wellington	South Island
Career	9	8	-	12
Urban volunteer	17	26	3	25
Rural volunteer	8	12	1	11
Total	34	46	4	48

We identified themes across the data

With participants’ consent, we audio-recorded the groups and, if a note-taker was available, took notes on their discussions. If possible, we also took observation notes on the context and non-verbal cues between participants as the discussion unfolded. If no note-taker was available, we conducted an abridged transcript analysis on the audio recordings. This involved transcribing the relevant and useful portions of the discussion.

We analysed the data by identifying themes that were consistent across different types of firefighters. Since we only spoke to a small proportion of firefighters in New Zealand, identifying consistent themes allowed us to generalise our findings.

We presented the preliminary findings at a sense-making workshop with Fire and Emergency facilitators. We then drafted the report and presented it to the Project Reference Group before the report was finalised.

Note, given the nature of qualitative research, we cannot quantify the frequency of themes. Moreover, the comments from focus group greatly depend on the questions asked and what participants decided to share. While writing up the report, we used qualifiers to distinguish the relative frequency of comments:

- Comments made by ‘many firefighters’ describe consistent statements that emerged multiple times across focus groups and interviews
- Comments made by ‘some firefighters’ refer to comments that cannot be easily quantified but came up with moderate consistency
- Comments made by ‘few firefighters’ refer to uncommon statements that were only made once or twice. We decided to include these comments despite looking for consistency because we felt these comments were crucial to the research project e.g. why individuals are ‘anti-technology.’

Sandar Duckworth
Partner
04 473 3883
sandar@litmus.co.nz

Liz Smith
Partner
04 473 3885
liz@litmus.co.nz

www.litmus.co.nz

LITMUS