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DTA Report 409
NR 1691

Blended Learning

James T Kerry
February 2016

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ABSTRACT

Blended learning is not new but the explosion of technology enabled learning techniques since 1990 is new and transforming the possibilities of delivering learning solutions in the military. This paper first defines what is meant by blended learning, then looks at the various learning options and the problems with implementing them. It concludes that most of the difficulties can be overcome but that a top down approach is needed to provide the impetus, infrastructure and direction to realise the business benefits. It recommends that a strategic plan be developed to provide the NZDF integrated learning environment necessary to achieve the Future 35 vision.

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EXECUTIVE SUMMARY

BACKGROUND

1. This report has been developed as part of the NZ Army Mobile Blended Learning Battlelab programme of work.

AIM

2. The aim the paper is to review the literature to define 'blended learning' and identify some considerations that should be taken into account if blended learning is to be effectively implemented across the NZDF.

RESULTS

3. An appropriate definition of blended learning for the NZDF is considered to be:

- *"Blended learning combines the best delivery methods available to provide optimal learning solutions."* Blended solutions involve a systematic analysis of the learning requirements to determine the most appropriate delivery method. The result of the analysis may include, but is not limited to, a combination of: classroom events, synchronised online learning, asynchronous or self-directed learning, adaptive training and education, simulator based learning, operational experience and social learning

4. All NZ soldiers have access to the internet either from work or from home or via mobile broadband. Many access the internet through multiple means. Two thirds of them had undertaken training in the 12 months to Sep 15, consisting of nearly three courses each.

5. Technology has provided a wide variety of new training and learning tools that can make training more engaging, accessible and effective but, with the exception of stand-alone simulators, few of these technologies are regularly utilised by the NZDF.

6. Blended learning (specifically synchronised online learning and self-directed learning) has the potential, in a small way, to contribute to opportunities for military women by allowing them to further their careers from home.

7. When introducing blended learning technologies, the NZDF needs to take into account gender differences. Consideration should be given to emphasising the usefulness issues for men, while offering women a more balanced analysis that includes productivity aspects, process issues, and testimonials from peers or superiors.

8. To enable the provision of blended learning across NZDF will require top down leadership. It requires investment in technical and physical infrastructure, subtle changes to the way we manage our people, different ways for instructors to operate and investment in the development of courses.

9. Blended learning is not confined to individual learning, it can be applied at all levels including joint and coalition training. It is quite possible that, for NZDF, the benefits will be greatest at these aggregated levels providing more realistic training with reduced risk to people and equipment.

10. It is essential that blended learning solutions are evaluated to assess whether or not the learning is effective. This is not always easy.

11. A support infrastructure is required not only to develop blended learning solutions but to manage and maintain e-learning, m-learning and apps.

12. The barriers to introducing new technologies are many but the key one is lack of management support. Individual training commands and stakeholders cannot put in place the necessary technologies, infrastructure and connectivity without the leadership of senior management and a coherent, properly resourced, NZDF strategic learning plan.

RECOMMENDATION

13. It is recommended that a comprehensive strategic learning plan is developed that will define the NZDF Learning Environment needed to deliver Future 35 vision.

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"Technology can amplify great teaching, but great technology cannot replace poor teaching." (1)

1. Introduction

This report has been developed as part of the NZ Army Mobile Blended Learning Battlelab programme of work (2). The aim this paper is to review the literature to define 'blended learning' and identify some considerations that should be taken into account if it is to be effectively implemented. Since the paper has been written with Army in mind it has a 'green' flavour but much of what is written is applicable across the NZDF.

The U.S. Army is refreshingly blunt in its assessment of the current state of its learning environment (3)*:*

> *"Current learning is typically instructor-led, timed to predetermined course lengths, and not synchronized to meet individual learner needs. Mandatory subjects overcrowd programs of instruction leave little time for reflection or repetition needed to master fundamentals.*
>
> *Passive, lecture-based instruction does not engage learners or capitalize on prior experience. The Army often assigns instructors arbitrarily, rather than through a selection process that accounts for subject matter expertise or aptitude to facilitate adult learning. Some instructors have skill gaps due to multiple deployments in non-military occupational specialty and/or branch assignments. With few exceptions, instructor positions are not perceived to be career-enhancing assignments."*

There is nothing to suggest that the NZDF is radically different. It is the second decade of the 21st century and yet little has changed in the way military training or learning is delivered. During the last 40 years of personal military experience whiteboards have replaced blackboards, PowerPoint has replaced Vu-graphs and a small amount of core training utilises computer based training, e-Learning or a simulator.

Elsewhere the world of education is changing across the board. In New Zealand four initiatives will transform the way our potential recruit's schooling is delivered over the next 5-10 years:

- Ultra-fast broadband is being installed in all schools. Already New Zealand has one of the highest rates of access to school computers in the OECD (1) and by 2016, 97.7% of schools and 99.9% of students will have access to an ultra-fast broadband capability (4).

- All schools are being provided with a fully-funded, dedicated internet service, via the Crown-owned company Network for Learning (N4L). This connectivity is helping teachers and students gain access to an array of online teaching and learning tools and resources (5).

- ‘Pond’[1] is designed to act as a central hub for digital discovery and participation, where educational resources can be accessed and shared more easily and effectively. Access to Pond is free for all school users (5)(6).

- Innovative learning environments are being developed with spaces that can be changed to support a range of teaching and learning approaches on any given day, and evolve over time. Students can study on their own or work with their peers in small groups. This encourages them to be independent learners and to develop skills that help them collaborate with others (5).

2. NZ Army Learner Profile

As of September 2015[2] (7) a typical Soldier:

- Accesses the internet at work (83%), at home (84%) (where most people have ultra-fast broadband or regular broadband connection) and through mobile devices (73%).

- Cannot access the internet from a recreation area (only 10% do this - the results for Air Force were 13% and Navy 28%). Many soldiers have access from multiple areas.

- Almost certainly (89%) has a smartphone but is less likely to have a tablet (40%).

- Has undertaken some professional training (63%) and miscellaneous training (66%). They may also have been involved in the delivery of training (44%)

- Mostly uses email, telephone calls (land line and mobile) and word processing to support training.

- Has difficulty accessing the defence network if they are a junior soldier.

Figure 1 shows a comparison of Army use of technology for training with the other Services. How Army personnel use the internet is shown at Figure 2.

3. Definition of ‘Blended Learning’

There are a variety of definitions of ‘Blended Learning’:

- “A method of delivering teaching and learning that involves both face-to-face teaching and the use of technology together at the same time”. For example the internet may be used to support a session that includes interactive tasks for the learner (8).

[1] Pond is not an acronym, rather a description for a collection of ‘buckets’ of shared teaching resources.
[2] These figures extracted from the Learner Profiles Survey 2015 raw data specifically for this report.

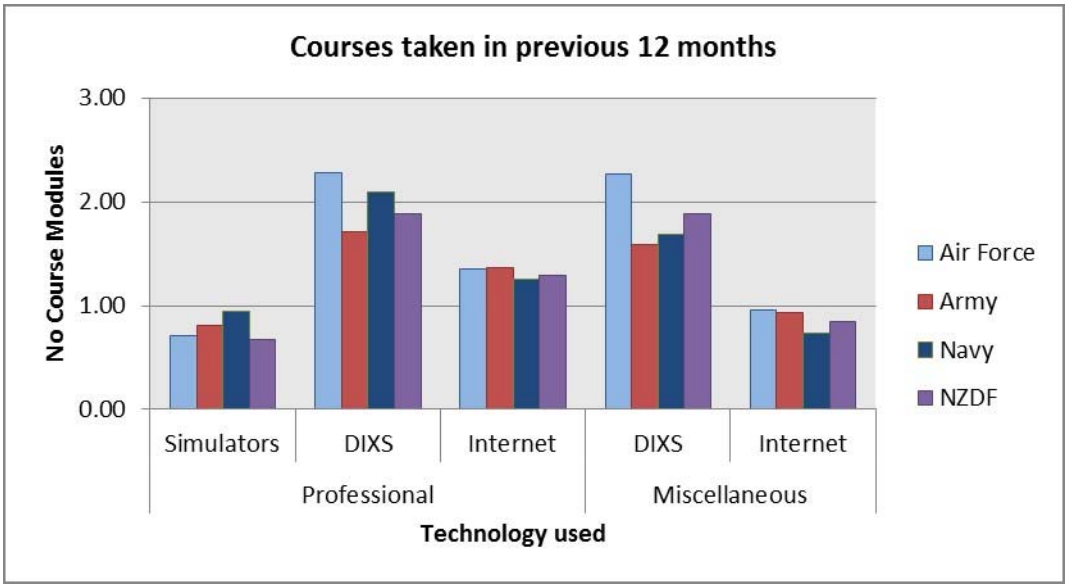

Figure 1: NZDF Course Modules Undertaken in Previous 12 Months

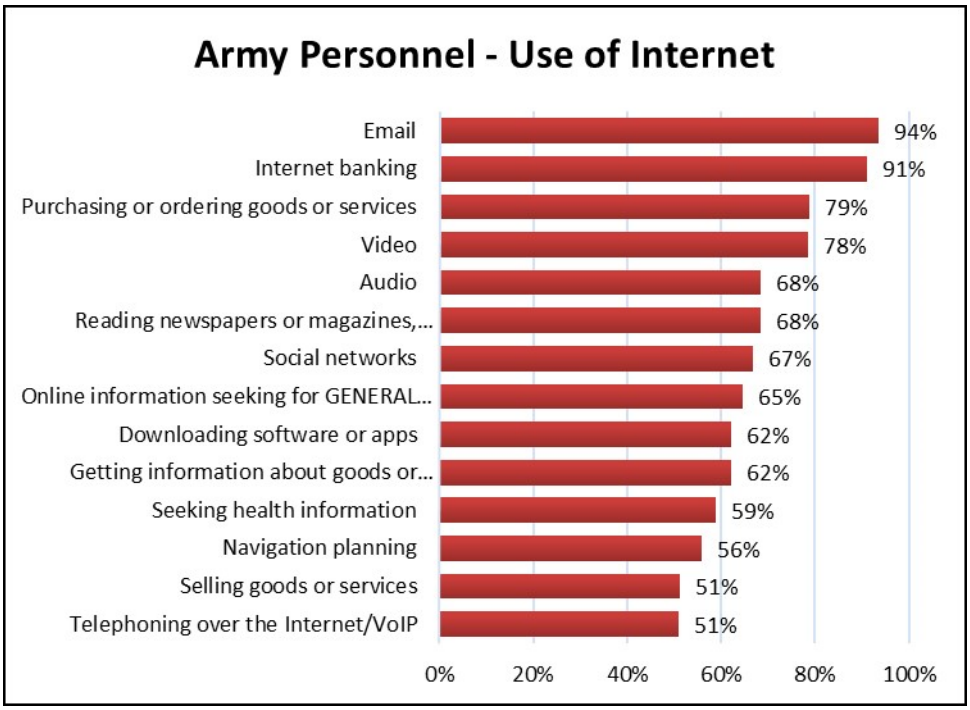

Figure 2: Army Personnel - Use of Internet

- "*Learning events that combine aspects of online and face-to-face instruction".* (9)

- 'Blended Learning' is "any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace" (10).

- "*Online technology-delivered instruction combined with face-to-face instruction".* It blends the efficiencies and effectiveness of self-paced, technology-delivered instruction with the expert guidance of a facilitator, and can include the added social benefit of peer-to-peer interactions (3).

- "*Blended learning is a combination of e-Learning and instructor-led learning experiences*" (11). Blended learning may include a combination of:

- Self-paced paper and online materials, including books.

    - Asynchronous online courses, provided for learners who participate on flexible schedules at their own pace, and in their own time frame.

    - Synchronous online sessions for learners who participate on the same schedule.

    - Classroom events (whether in a traditional classroom or online environment).

    - Coaching, mentoring, and pre- and post-event activities.

    - Self-assessment, pre- and post-testing, grading, evaluation, or ratings and reviews.

- In 2012 the SRI International Center for Technology in Learning studied the adoption of blended learning models in selected schools in California and Louisiana The resultant report (12) states that 'Blended Learning' has the following components:

    - It involves teaching and learning within a formal education program

    - Students learn at least in part through online delivery of content and instruction

    - Students have some level of control over time, place, path, and/or pace of instruction

    - Part or all of instruction is delivered away from home in a supervised, brick-and-mortar location

- The NZDF has two Blended Learning definitions:

    - The NZ Defence Manual of Learning (13) definition is: "When two or more learning solutions are used to implement a syllabus". The learning solutions must employ different delivery methods which may include but are not limited to instructor-led, self-paced, online and on-the-job learning.

- The Foundation Instructor Learner Guide (14) definition is: Blended learning is a combination of traditional face-to-face classroom methods with more modern computer mediated activities.

A comprehensive definition, more in line with international practice is proposed for NZDF as follows:

- "*Blended learning combines the best delivery methods available to provide optimal learning solutions."* Blended solutions involve a systematic analysis of the learning requirements to determine the most appropriate delivery method. The result of the analysis may include, but is not limited to, a combination of:

  - Classroom events. Whether or not supported by computer based training or utilising devices such as laptops or tablets, online resources and including hands on tasks.

  - Synchronised online learning. For physically dispersed students who participate in a virtual environment.

  - Asynchronous or self-directed learning. For learners who participate on flexible schedules at their own pace, and in their own time frame.

  - Adaptive Training and Education. Including Intelligent Tutoring Systems.

  - Simulator based training. Live, Virtual and Constructive, including Gaming.

  - Operational experience. This includes: Real world experiences, Coaching, mentoring and On Job Training (OJT).

  - Social learning (15). This includes; Peer-to-peer interactions, Chat boards and communities of practice.

4. Blended Learning

4.1. Classroom Events

Blended learning offers a means of addressing a range of student learning styles, which are often difficult to address using traditional teaching methods. It switches the focus of the learning onto the student and encourages personal accountability or self-direction. A 2010 meta-analysis and review of online learning studies (16) suggests that this type of approach is successful. According to the report, *"students exposed to both face-to-face and online education were more successful than students entirely in one camp or the other."*

Advanced Blended Learning (17) envisions a learning environment that changes the roles of instructors, students and their supervisors. Instructors will use technology and collaborative tools to enrich the learning in the classroom and remain with their students as mentors and coaches. Students will become engaged earlier and remain

engaged in the learning after they return to their home station, with their roles evolving into peer mentors. Supervisors will become critical players and sources of support and coaching when the student returns to the home station by creating a culture of collaboration, and encouraging peer-to-peer communication and experiential learning.

4.2. Synchronised Online Learning

Not all soldiers can get to the learning they want when they need it; they may be deployed overseas or at sea, on long leave, reservists, in another part of the country, or at home. Synchronised online learning allows soldiers to participate in some lectures remotely. Such a facility might help to 'maximise opportunities for military women in the NZDF'(18). Alternatively, the instructor may not be able to get to the classroom at the right time; they may have had to go to the Joint Headquarters at short notice or suddenly need to be at home to support the kids. Why shouldn't they deliver the lecture remotely? Synchronised online learning or virtual classroom technology allows this to happen. This is not some futuristic concept, many of our soldiers, particularly those from remote areas or small schools, may have experience of the Ministry of Education Virtual Learning Network (19).

A virtual classroom is an online classroom that allows students and instructor to communicate with one another, view presentations or videos, interact with other participants, and engage with resources in work group. It could be as simple as a video conference or Skype conference but is more usually associated with dedicated software employing multiple technologies such as: web conferencing, video conferencing, livestreaming, and web-based VoIP to provide remote students with the ability to collaborate in real time. To enhance the educational process, applications may also provide students with asynchronous communication tools, such as message boards and chat capabilities. As well seamlessly providing this suite of tools, a successful virtual classroom needs to have some other functions, in particular (20):

- Accessibility. Students should be able access the virtual classroom from anywhere.
- Software and device agnostic. Students and instructors should be able to participate from any device (PC, laptop, tablet, mobile) utilising any operating system (Windows, iOS, Android, Mac, Linux) and any web browser (Firefox, Chrome, IE).
- Record and replay.
- Integrate with the Learning Management System.

- Manage classes and students with features like attendance reporting, recording, and notifications.

Figure 3: Virtual Classroom Software
(courtesy of Elluminate now Blackboard Collaborate)

4.3. Asynchronous or Self-Directed Learning

In 1991, Carolyn Saunders published an article 'Pedagogy v Andragogy: Are We Treating Our Students Like Children?' (21) and said; *"Perhaps we need to ask ourselves if our students act like children because we are treating them as children, rather than adults, in the classroom. Or to take this analysis one step further, perhaps we are using principles of learning more suitable to children than to adults."* More than twenty years later her question is just as relevant.

Andragogy is *"the art and science of helping adults learn".* Pedagogy is derived from the Greek *paid*, meaning 'child' and *agogus* meaning 'leader of'. It is derived from a European philosophy of religious teaching (22) or as it is commonly referred to '*the sage on the stage'* (23).

When recruits join the NZDF they are dependent on their instructors and the military system to deliver the right training at the right time but gradually, as they gain knowledge, experience and motivation, the hypothesis is that there is the potential to shift the emphasis and become self-directed. However, the military often continue to adopt a predominately directed or Associationist (24)(spoon fed) approach to most training. This might not be the most efficient way to prepare military people for their roles. One alternative is to motivate people to take some responsibility for their own learning and start to seek it out for themselves. This has been termed self-directed learning (22).

A 2013 survey of NZDF assessed the self-directed learning readiness (SDLR) of NZDF personnel (25). The results of the survey indicated that the majority of Army

personnel will take to self-directed learning but that a substantial minority (some 26%) will find it more difficult and will need alternative strategies, incentives and support if they are to achieve the learning objectives. There was little or no relationship between SDLR scores and age or length of service, but a direct link between SDLR scores, rank, education and whether or not the student is in a stable relationship (those in a stable relationship appear more motivated and this is what is expected from the theory (22)). Once initial training is complete, the degree of self-directed learning may be increased with some confidence provided alternative strategies, support and encouragement are in place.

Asynchronous learning may include paper based learning and online materials, including books, e-learning, videos and podcasts.

Just like synchronous online learning it offers the opportunity for those unable to attend formal instruction to continue their learning while they are away but in this case at their own pace.

4.4. Adaptive Training and Education

Adaptive tutoring is defined as "*any instruction that is adjusted to meet the specific learning needs of individuals or teams"*. Future adaptive computer-based tutoring systems will be able to use individual differences as the basis for tailoring instruction to an individual or team. The aim is for the Computer Based Training System (CBTS) to unobtrusively to measure the student's cognitive state (motivation, comprehension level of engagement) and affective state (mood, emotion and motivational level) in near-real time, predict the future state and then to select an optimal instructional strategy. The end result is anticipated to be faster time to competence, improved job performance and better retention of learning. It is thought that the return on investment, particularly in large organisations such as the U.S. Military, can be justified through a reduced training pipeline, a saving in infrastructure (classrooms) and support (instructors) (26)(27).

One current CBTS architecture is the Generalized Intelligent Framework for Tutoring (GIFT). GIFT is a framework of tools, methods and standards that make it easier to author CBTS, manage instruction and assess the effect of training conducted using CBTS. GIFT is being developed by the U.S. Army Research Laboratory - Human Research and Engineering Directorate (ARL-HRED) (28) and is available to download, or launch on the web, now. It has two great advantages for the NZDF:

- It is being developed by the military for the military.
- It is open source and therefore freely available.

4.5. Simulator based training

Simulators fall into three basic categories(26)(29):

Description	Definition(30)	NZDF examples
Live.	Live simulation involves real people operating real systems. Military training events using real equipment are live simulations. They are considered simulations because they are not conducted against a live enemy.	TESS
Virtual	Virtual simulations involve real people operating simulated systems. A video game or a cockpit mock-up used to train pilots are examples of virtual simulation. A simulation involving real people operating simulated systems. Virtual simulations inject human-in-the-loop in a central role by exercising motor control skills (i.e., flying an airplane), decision skills (i.e., committing fire control resources to action), or communication skills (i.e., as members of a C4I team).	VBS2 Weapon Training System Steel Beasts
Constructive	A constructive simulation includes simulated people operating simulated systems. Real people stimulate (make inputs) to such simulations, but are not involved in determining the outcomes. A constructive simulation is a computer program. For example, a military user may input data instructing a unit to move and to engage an enemy target. The constructive simulation determines the speed of movement, the effect of the engagement with the enemy and any battle damage that may occur.	OneSAF
LVC	A broadly used taxonomy describing a mixture of live simulation, virtual simulation, and constructive simulation. Note that LVC always includes a real or synthetic person in the simulation as contrasted with a science based simulation which models a phenomenon or process only.	Nil

Table 1: Definition of Live, Virtual Constructive simulation

Training in the live environment with operational equipment provides a high fidelity "training device" (although system employment and instructional support may be limited). The advantages of using simulation in training may be summarised in five areas(26) (31):

- Improved learning: Once basic facts, nomenclature, concepts, and straightforward procedures have been memorised and understood, simulation can be used to compress years of experience into days, weeks, or months.

  Simulated time may be sped up, slowed down, or paused. It can also be completely reversed, allowing

learners to deal repeatedly with specific problems, events, or operational issues.

LVC technology can, in some circumstances, enable coalition and joint distributed mission rehearsal or pre-deployment training to take place with our partners from home base, before deployment. This has the potential to enable deployed forces to arrive in the theatre of operations and 'hit the ground running' avoiding the dangerous bedding-in period that is typical of many coalition operations (32).

Live training can be enhanced with virtual or constructive elements to remove some of the unrealistic constraints of peacetime physical training areas.

Realistic enemy profiles can be run that would otherwise be either impossible or too dangerous to replicate.

- Economy: Simulated materiel, equipment, and other resources, physical or fiscal, may be used, misused, and/or expended as needed.

  The fixed costs of a training system, such as buildings, training devices, ranges, and core instructional staff can be expected to increase if a mix of training environments is employed. But costs such as fuel, ammunition, targets, wear on operational equipment, travel, field feeding and incremental staff are reduced

  Training in a virtual environment frees operational personnel and equipment from force generation and makes them available for force employment.

- Visibility: Simulation can make the invisible visible and control specificity so that learner discerns both the forest from the trees and the trees from the forest.

  Learning can be recorded and replayed for after action review.

- Reduced risk: Accidents in simulation avoid damage to operational equipment and injury to operational people. Instead they provide learning opportunities.

  Simulated lives and health may be hazarded to any extent required for training.

  Hearing loss and lead exposure, are eliminated.

Environmental noise, range fires, and soil contamination are reduced.

The public are not inconvenienced by danger areas or concerned about the safety of endangered species.

- Security benefits: Training unobserved in a virtual environment can preserve the confidentiality of tactics and systems (own and enemy) performance.

In summary, simulation can provide massive, affordable amounts of practice with realistic feedback that exposes individuals, crews, teams, and/or units to situations that would range from the impracticable to the unthinkable in real world settings.

4.6. Workplace experience

Workplace experience, on-the-job learning or On Job Training occurs in a wide variety of situations such as: Every-day work within a unit or headquarters, deployments, secondments, exercises, exchanges and tours of duty. It can also provide learning experiences through mentoring and coaching (13). It may be formal, perhaps guided by a Task Book, or informal such as experience gained during an operational deployment.

4.7. Social learning

Social media have opened up the gateway to seamless interactivity and collaboration between learners. They have broken down the divide between 'expert' and 'public' and changed the very notion of what 'knowledge' is and how we use it (15).

In the tertiary education sector, many educators have already adopted social networking technologies such as wikis, blogs and services such as Twitter, Facebook and Google+. They also embrace content sharing sites such as Flickr and Pinterest. These technologies and services can support face-to-face learning as well as online learning, but their adoption is likely to enhance online learning most (33).

The Learner Profiles Survey (7) already indicates that social media is being used informally by NZDF personnel to support training. The 2015 survey showed that Army personnel used social networks on 36 working days per year (about once a week) to help with NZDF training / study, the highest use of any of the Services (Figure 7).

'Enterprise social media' are defined as (34):

- Web-based platforms that allow workers to
  - communicate messages with specific co-workers or broadcast messages to everyone in the organization;
  - explicitly indicate or implicitly reveal particular co-workers as communication partners;

- post, edit, and sort text and files linked to themselves or others; and

- view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing.

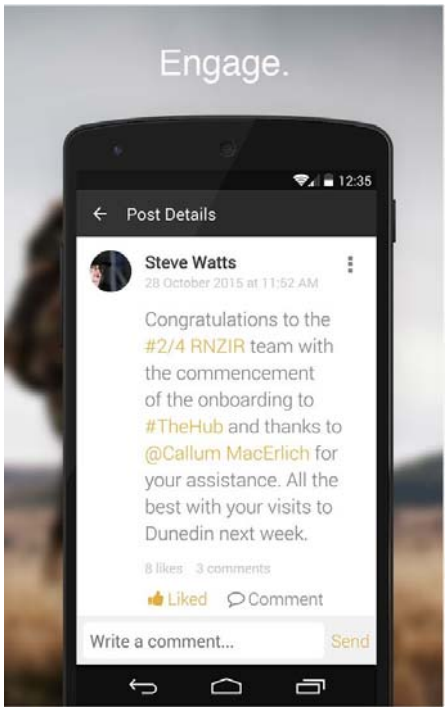

Figure 4: The Hub

The NZDF has recently implemented an internet based 'enterprise social network' named "The Hub'(35) The purpose of the application is "*to provide current and released NZDF military members and civilian employees as well as trusted partners with a tool to engage, share and learn*". Other key objectives for this App are to deliver members with targeted vacancy opportunities, news stories, announcements, and most importantly a platform to connect with each other at anytime, anyplace. The Hub is available for both Android and IOS.

Despite a paucity of publicity, it has acquired more than 2000 participants in the first four months of its existence. The Hub has some limited capability to deliver learning such as videos and a latent capacity for webinar / conferencing but the lack of any connectivity with the defence network and the Learning Management System (LMS), limits its usefulness in this regard.

A US Army Report (36) envisages the potential for social networking using mobile devices in the 5 to10 year timescale with lieutenants who presently work on their orders independently and receive summative feedback from the entire class and their instructors. If the students had smartphones, they could:

- blog about their ideas and progress on their orders and receive formative feedback from their peers.

- use a smartphone application (app) to draw the graphics for their orders and share them with their peers and receive immediate feedback.

- send each other links to information on the Internet.

Receiving feedback from instructors and peers many times throughout an activity promotes knowledge acquisition and learning in a much more profound way than receiving feedback at only one time on the final product.

These technologies are challenging to the NZDF for all the same reasons as any non-institutionally controlled technology. However, they can be integrated into existing curricula without major change or re-validation and will be readily used by

most NZDF personnel (33). The NZDF LMS has the ability to set up ‘communities of practice’ but these are rarely used.

5. Infrastructure

5.1. Connectivity

When given the opportunity, learners use a blend of access to e-Learning based on their preferred learning environment (work, home, classroom, mess). Difficulties experienced by students who have already encountered technical problems, may lead them to a sceptical view of how e-Learning can be delivered across Defence; a view that they could pass on to other learners or use to make management decisions about the implementation of e-Learning (37).

The 2015 NZDF Learner Profiles Survey (7) provided insights into Army personnel use of technology. Most people have easy and regular access to DIXS (although Army junior ranks can often struggle to access a DIXS terminal) and nearly everyone has access to the internet either at work, or at home or via mobile broadband. Many personnel already use their own personal equipment and software to some extent to support NZDF training. 67% of Army personnel use a private PC regularly, 89% a smartphone and 40% a tablet. When asked which NZDF resources they would like to access on a mobile device; manuals / documentation topped the list (76%) followed by instructional videos (61%).

On the downside failure to provide access to the LMS to students at home via the internet and to deployed units has severely hampered efforts to introduce greater proportion of self-directed learning into the NZDF. This failure has been highlighted on several occasions (25)(38)(39) and is contrary to the intention of the original LMS Business Case (40).

5.2. Implications for Classroom Design

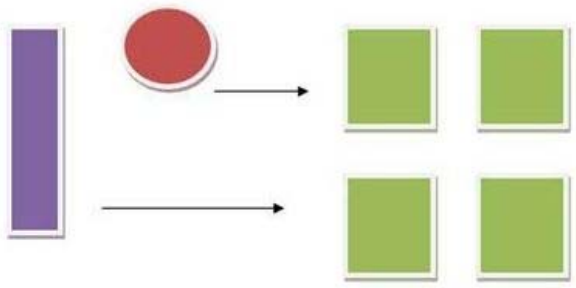

Figure 5: Interaction Flow in a Conventional Classroom (42)

If blended learning is to be introduced the physical set-up of classrooms needs to be adjusted to reflect these new practices. Instead of the traditional rows of chairs with writing surfaces facing a podium (Figure 5), universities are creating more dynamic classroom layouts, often with seating arrangements that foster collaborative work. These redesigned spaces support what is often referred to as flexible or active learning. While active or free design (Figure 6) learning spaces vary, they share many common features. The typical podium is moved from the front of the classroom to the centre and is surrounded by round or oval tables with movable chairs that enable students to shift between groups as needed. Each table may be technology-enabled, with interactive whiteboards or other marking surfaces. (41).

Ruth Reynard (42) envisages classrooms or learning spaces "*designed for instruction not control"* she feels that we are caught between two worlds and believes that *"as long as we retain the idea that the flow of information is from the teacher while students are the receivers of this information, we will never maximize the potential of new technology*".

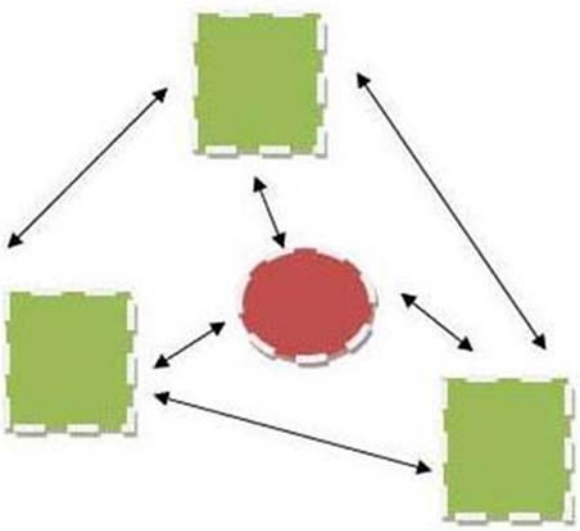

Figure 6: Interaction Flow in a Free Design Classroom (42)

An empirical study conducted at the University of Minnesota (43) came to the conclusion that the classroom space determined the behaviour of instructor and student and the classroom activities. It showed that active learning does not work well in a conventional classroom and that lectures do not work in a free design classroom. The implication of this for NZDF is that training developers should consider adjusting the pedagogy to fit the space in which training is to be conducted.

Finally, when investing in new classrooms, there are a number of design considerations that need to be addressed (44):

- Design learning spaces around people.
- Support multiple types of learning activities.
- Enable connections, inside and outside.
- Make space flexible.
- Design for comfort, safety, and functionality.
- Reflect institutional values.
- Specific disciplinary needs (e.g. a trade workshop).

5.3. Bring Your Own Device (BYOD)

BYOD is a strategy that allows employees to use a personally selected and purchased client device to execute enterprise applications, access data and learning. BYOD is usually considered to cover smartphones and tablets, but may include PCs and laptops. Some companies provide a subsidy to either cover increased data usage or purchase of a suitable device.

Employers and higher education institutions are finding that when given the opportunity to use their own device, users are saved from the effort and time needed to get accustomed to new devices and can therefore accomplish tasks with more ease and efficiency (41).

A study (45) predicted that by 2017, half of the world's employers will expect their employees to supply their own device for work. It goes on to predict that by 2020, 45% of companies will have ceased to provide personal devices and a further 40% will offer a mixed solution of company provided devices and BYOD.

To some extent the NZDF already offers a mixed solution with many management roles having the benefit of a smartphone and access to some corporate functions plus limited access to the Defence Network via RAS token. However, NZDF personnel are willing to use their own devices to access NZDF learning materials providing it does not involve additional expense (7) and, as we have already noted more than 80% of NZDF personnel already own a smartphone, 40% a tablet and in excess of 90% a PC or laptop. They are already using their own devices to help with NZDF training / study. Figure 7 shows the use of personal applications as the average number of working days per person in the previous 12 months[3]:

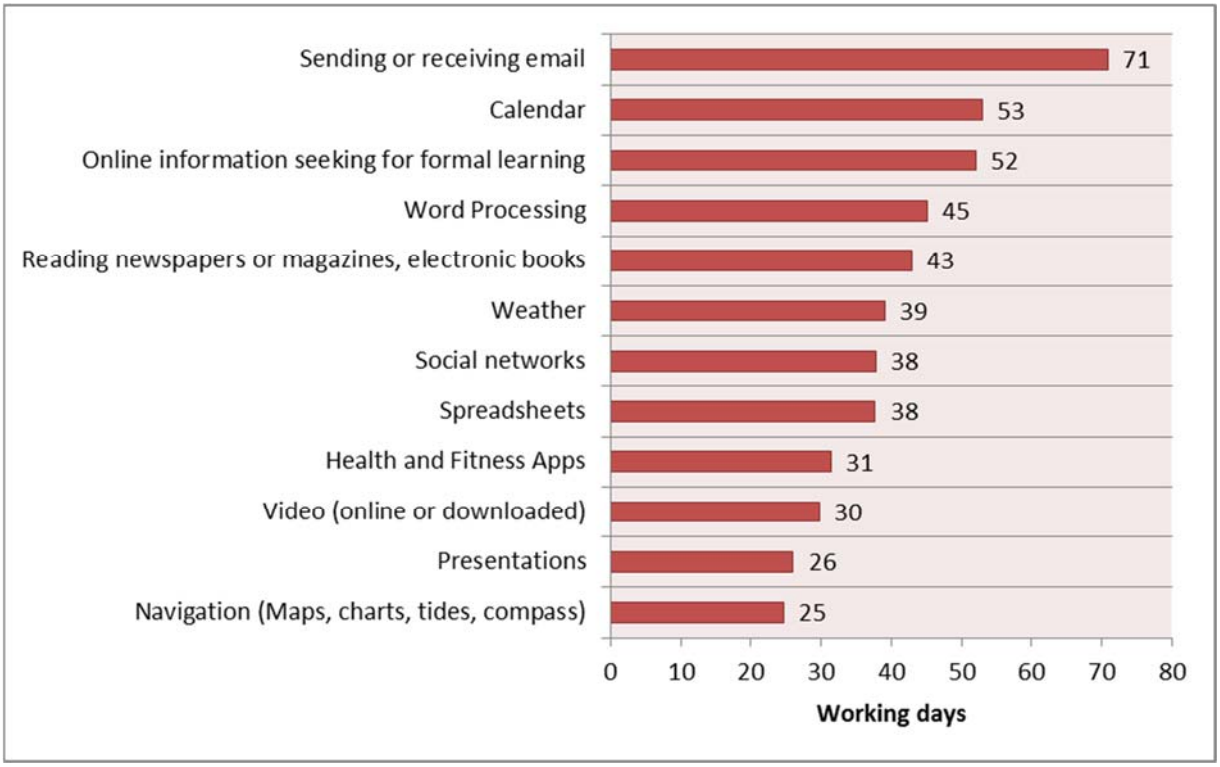

Figure 7: Army personnel use of own devices to support NZDF training Sep 14–Sep 15

[3] There are approximately 228 working days in a calendar year after weekends, leave entitlement and public holidays have been excluded.

5.4. Digital Literacy

Jisc[4] define digital literacy as "*the capabilities which fit someone for living, learning and working in a digital society."* and provides a guide for the strategic development of digital literacies. While this is geared to the academic environment there is much within it that would be of benefit to the NZDF (46).

It is often assumed that a new generation of recruits is joining the NZDF. Immersed almost from birth in the internet[5], surrounded by technology in the home and subject to sophisticated IT based education at school; it is presumed they have sophisticated technology skills, a whole new set of cognitive capacities and an expectation of 'high tech' training in the workplace. (47) (48) (49).

But, it turns out, things are not that simple. While technology is embedded in their lives, young people's use and skills are not uniform. There is no evidence of widespread and universal disaffection, or of a distinctly different learning style the like of which has never been seen before. We may live in a highly technological world, young people may do things differently, but there are no grounds to consider them alien. Education may be under challenge to change, but it is not clear that it is being rejected (50).

Contrary to popular assumptions it appears that Millennials[6], are not that different to previous generations. Although familiar with a technological world, broad-based conclusions that everything in the NZDF training world must change are not borne out by the facts. A recent collaborative study between the NZ DTA and Australian DST Group (51) made four key findings:

- The first was that rates of ownership of digital devices vary considerably depending on the device.
- The second key finding was that, despite high rates of ownership of some digital devices, participants appear to be using them for a relatively narrow range of functions.
- The third finding was that participants had mixed views towards the use of technology in training.
- The fourth key finding was that the digital literacy levels of older military personnel are as diverse as their younger counterparts.

In the NZDF, although people think that technology could be used more effectively they are unsure that the use of technology achieves better results but agree that the NZDF needs to provide students with "*more formal training for the technology used in instruction*"(39)(Figure 8).

[4] Jisc (formerly the Joint Information Systems Committee) is UK public body that provides digital solutions for UK education and research. It is funded by a combination of the UK further and higher education funding bodies, and individual higher education institutions.
[5] I recently experienced an excited mother telling me their child had spoken its first word – "tablet"!
[6] Those born after 1 Jan 1981 and before 1 Jan 2000 (also known as Gen Y)

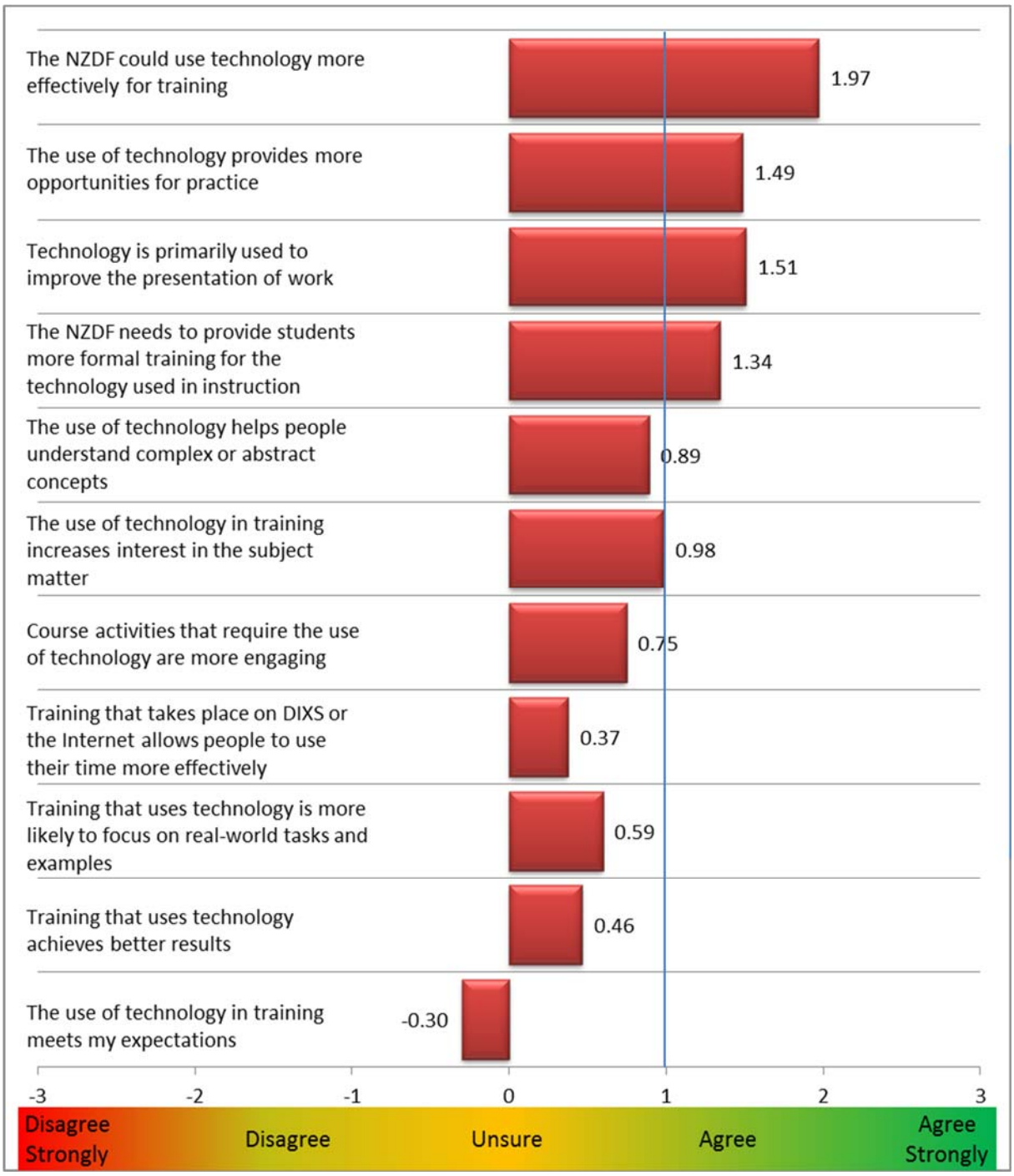

Figure 8: Army personnel opinion on the use of technology for training in the Defence Force

In summary, there is no need to panic. Technology offers us a much wider range of options to provide training that is both efficient and effective. We need to think carefully how we use it in the NZDF to best effect and we need to prepare students, instructors and wider leadership to use it effectively.

To quote a colleague at a recent TTCP meeting:

> *"Good training is good training no matter what the technology."*
>
> *Scott E. Graham, Ph.D.*
> *Chief*
> *US Army Research Institute*
> *Fort Benning*

6. Preparation

6.1. Leadership

6.1.1. SENIOR LEADERSHIP

> *"Organisational approaches to e-learning are more likely to be successful when they are supported by institutional strategies, policies, plans, monitoring and evaluation. E-learning strategies are more likely to be effective if they take into account organisational culture and are underpinned by a rationale that has strong support from stakeholders."* (52)

Operational deployments provide ideal opportunities for study due to the amount of 'downtime' (37) but our IT support of learning for deployed personnel (including those deployed at sea) is negligible this has been an avoidable failing of the NZDF since the introduction of the LMS (39)(53).

Conversations with the NZ Defence College Technical Training Unit staff highlight that the implementation of thin client infrastructure across defence is preventing the deployment of media rich (e.g. video, 3D models) training that has already been developed.

If a range of blended learning solutions are to be made available, it needs to be driven from the top. There needs to be an NZDF learning strategy that provides the policy, outlines the strategic journey and maps the benefits and business outcomes to overall strategic direction (54). The strategy needs to support the two dimensions of competency development Individual (or career) and Force (including Joint and Coalition) (26)[7] (Figure 9).

Pan-NZDF IT services need to be put in place to support the agreed strategy (52). The intention to provide individual learning opportunities at home, in the work place and whilst deployed needs to be clearly articulated. This cannot be achieved by single service training organisations or from bottom-up initiatives (55).

6.1.2. MIDDLE MANAGEMENT

The command chain needs to make allowances for people to conduct e-Learning or self-direct learning. An important issue is the mind-set of the Chain of Command which can cause a barrier to the creation of a workplace learning culture. When a commanding officer considers that e-Learning should be carried out during 'leave', education and training is hardly being 'encouraged', or 'expected as part of the daily

[7] Chapter 3

workflow.' If the Chain of Command is not uniformly fulfilling its 'responsibility to ensure subordinates are both supported and encouraged to participate in learning' the organisation cannot claim to have a workplace learning culture (37).

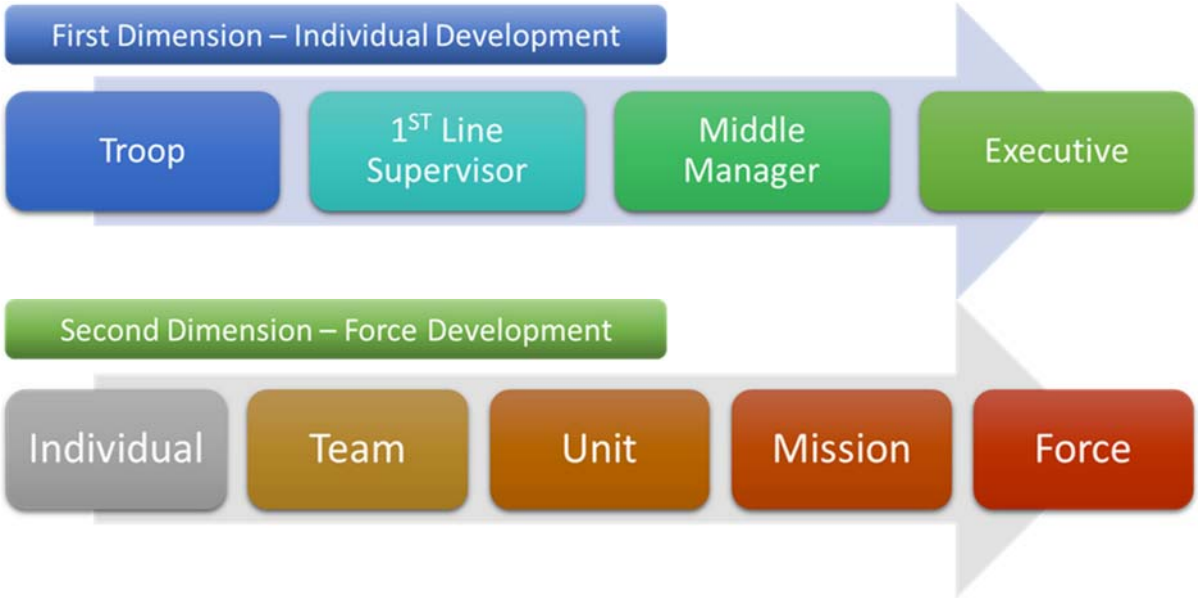

Figure 9: The 2D Competency Model(26)

In order to create a workplace learning culture, uniformity of approach and attitude towards 'time off' as well as the provision of mentor support for study is required. It is the lack of mentoring provision, connectivity issues and the difficulties surrounding time to study which emerge as the key factors shaping perception of e-Learning (37).

A RAND Corporation paper (56) came to the following conclusions with regard to distance learning;

- Students need to be given time to study.
- Time between distance learning and resident phases of a course should be minimised.
- Consideration should be given to tailoring or even omitting the distance learning phase of a course where students already have the necessary knowledge.
- Student progress should be tracked during distance learning and support provided when needed.
- Distance learning should be evaluated in just the same way as conventional learning.

6.2. Instructors

Military instructors ("Instructor" is no longer a trade) are rarely professional teachers, i.e. those who have a three year teaching degree or, for the most part, a degree plus teaching diploma. They are hard-working military professionals with some

experience that gives them credibility with the students. At the moment, the Army uses a 'just in case' system to develop instructor capability, meaning everyone is trained to a very basic level. Skills for these roles are developed in the junior non-commissioned officer promotion course that provides a basic introduction into instructing (57). The NZDC provides training to the other services through course D11001 Foundation Instructor. This consists of 10 working days in the classroom plus an on job training session that results in a National Certificate in Adult Education and Training (Level 4)(58). This may be followed by the 8 day Advanced Instructor Course that takes students to NZQA Level 5 Certificate in Adult Education (59).

Adding technology to training requires instructor development (60). Preparing the organisation to confidently and effectively use technologies is critical to creating a successful learning environment. Instructors must be given time to become comfortable with the technology; there is overwhelming evidence supporting the need for instructor training so that they can effectively teach using new methods and technologies (61).

Further if the classroom is to become a 'free design' learning space (see paragraph 5.2), the move from being an instructor to a *"facilitator of learning"* (22) should not be taken lightly. It is not straightforward. It requires considerable preparation, a complete change of mind-set; something more than taking your predecessors' PowerPoints and updating them. Conducted properly this style of learning can be very effective but it's not an easy solution for a military organisation.

Because NZDF instructors are not teaching professionals, the NZDF Systems Approach to Learning (13) relies on course syllabi being designed by full time Learning Designers. Yet, as of 15 Oct 2015, of 314 Army courses on the Learning Catalogue only 14 were fully documented and a further 115 have just a validated Course Data Sheet. The remaining a 199 Course Data Sheets are yet to be validated (62). This needs to be remedied.

6.3. Students

To become successful self-directed learners, Soldiers and NCOs must take personal responsibility for learning a very wide range of self-regulatory skills that should be used prior to, during, and following the self-directed learning experience. They must also learn to be self-aware of their learning as they proceed through the self-development process, and critically evaluate their learning at all stages (63).

Organisations can assist in this process by:

- providing insight into the competencies that should be developed,
- assisting with motivational assessment and identifying resources, and
- providing feedback throughout the learning process about:
    - initial knowledge gaps,
    - the effectiveness of learning strategy selection, and

- ensuring that the learning has improved the targeted competencies.

There is an assumption that digitally literate learners will spontaneously leverage digital technology when learning. Research has shown (64) this is not the case. What has been shown is that there is a strong need to properly support the learner when new technology is used. Without proper integration tablets, especially if the user is unfamiliar with them will be underutilised. In order for mobile devices to provide benefits to institutional education, instructor support and guidance is critical (64)(65). This need has also been identified by NZDF Personnel in the Learner Profiles Surveys (7)(39)(53).

6.4. Courses

A UK review of literature and Defence standards identified the following seven key decision factors for the selection of e-Learning (66):

• Cost effectiveness	is e-Learning a cost effective medium for delivering instruction?
• Learning context and practical considerations	is e-Learning possible given the context of the delivery situation and other practical considerations?
• Learning task considerations	is the learning task suitable for e-Learning?
• Grouping strategy considerations	is the learning task capable of being handled through individualised instruction?
• Learner characteristics	do the learners have the necessary skills, attitudes and motivation to conduct e-Learning?
• Media attributes	does e-Learning support the necessary media attributes and interactions required for the instruction?
• Instructional management considerations	is e-Learning supportable within the wider organisational/cultural context?

A US report (67) considers the issues surrounding the introduction of Interactive Multimedia Instruction (IMI) to the Army Learning Model (ALM). They argue that as the Army moves from an instructor led approach to a learner-centric approach the design of IMI needs to change. It needs to be engaging and designed to give learners both structure and autonomy in their learning experience. A design philosophy that focuses on developing generally applicable, one-size-fits-all IMI is less applicable in this context. Learning modules and chunks need to be built for stand-alone use. The component parts (e.g., graphic images, narrations, text files)

should be constructed and labelled for easy identification and potential changes. In particular, IMI can:

- be designed to apply both highly-structured and more discovery-oriented learning approaches depending on the intended context of use,
- intersperse whole-task and part-task problem solving activities to motivate learners,
- use task-specific feedback to help learners develop awareness of their learning needs, and
- include choices among different learning paths to give learners autonomy and control over their learning process, enabling them to address specific points of need.

Adapting existing material can be both costly and unsatisfactory and it might be better to apply tailored training techniques to future IMI at the outset incorporating key principles and techniques into its design.

The Defence Science and Technology Organisation examined a blended learning course that had been conducted over a number of years by contractors on behalf of the Australian Defence Force. The course was the Vehicle Mechanic (VM) course at the Army School of Electrical and Mechanical Engineering (ASEME), ten key success factors were identified (68):

- It needs careful design, dedicated management and trainee coordination, which, in the VM BL case, are provided by the contractors. This point is also supported by literature review (69).
- The course content is structured into relatively knowledge independent modules that are run in parallel.
- The flexible course starting time enables incoming trainees to join the course at any time of the training year (trickle feed) which reduces trainee waiting after admission.
- The course material is organised in e-books which have integrated multimedia components that are interactive to learners. Assessments are also integrated into the e-books and are linked to the course management system.
- The trainee progress process is designed to accommodate a variety of trainee' abilities and prior learning experience so that they can progress through the course in different pathways with minimum time in the course.
- A trainee progresses through the course as an individual, and is not constrained to a cohort or panel and hence graduates as an individual.

- The workshop space arrangement enables trainees' easy access to equipment and training aids, as well as to the instructors for consultation and assessment.

- The dedicated course administrator coordinates trainee requests and progress.

- The experienced course developers regularly review and update the course structure, content and e-book material.

- The course flexibility (course modular independence) makes it easier for lessons learned from operational deployments to be incorporated into the course in a timely manner.

6.5. Gender Differences

Morris, Venkatesh et al., (70)(71), highlight the different attitudes to the adoption of technology by gender. The research suggests that men's technology usage decisions were more strongly influenced by 'perceptions of usefulness'. In contrast women were more strongly influenced by perceptions of 'ease of use' and 'subjective norm'[8]. The paper argues that organisations attempting to adopt new technology "*may wish to emphasize usefulness issues for men, while offering women a more balanced analysis that includes productivity aspects, process issues, and testimonials from peers or superiors"*. Subsequent research took into account age and gender concurrently (71). This showed that a clear pattern of differences existed between men and women over the age of forty and that these results were relatively stable over time. However, for younger workers, the picture was less clear with a unisex pattern emerging where men and women were more alike.

6.6. Team Training

Simulation is an effective means to meet a wide variety of tactical training requirements and is particularly well suited to developing the cognitive skills necessary to turn a team of experts into an expert team (72). To take advantage of this capability, simulations need to be considered as part of blended training solutions that can cost-effectively meet the training requirements. In stand-alone mode, the games appear to be best suited from individual up to company level, however, when used in combination with other virtual and constructive simulations may well assist in the collective training of larger groups.

Grossman and Salas (26)[9] consider simulation to be especially applicable to the military environment enabling a team of experts to effectively operate as an expert team by developing both task-work and network competencies in the safety of a virtual environment. They also describe the instructional features needed for enhancing team training in a virtual environment.

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[8] Subjective norm is defined as the degree to which an individual believes that people who are important to her/him think she/he should perform the behaviour in question (84)
[9] Chapter 10

In the same book (26)[10] McIntyre and Smith provide five key tenets that go towards making distributed collective training effective. Namely:

- Adopt a user centric design approach.
- Create a total training environment.
- Do not underestimate the benefits of co-location.
- Provide a flexible and dynamic training environment.
- Use an expert white force as part of the exercise management function.

6.7. Deciding the Optimum Blend

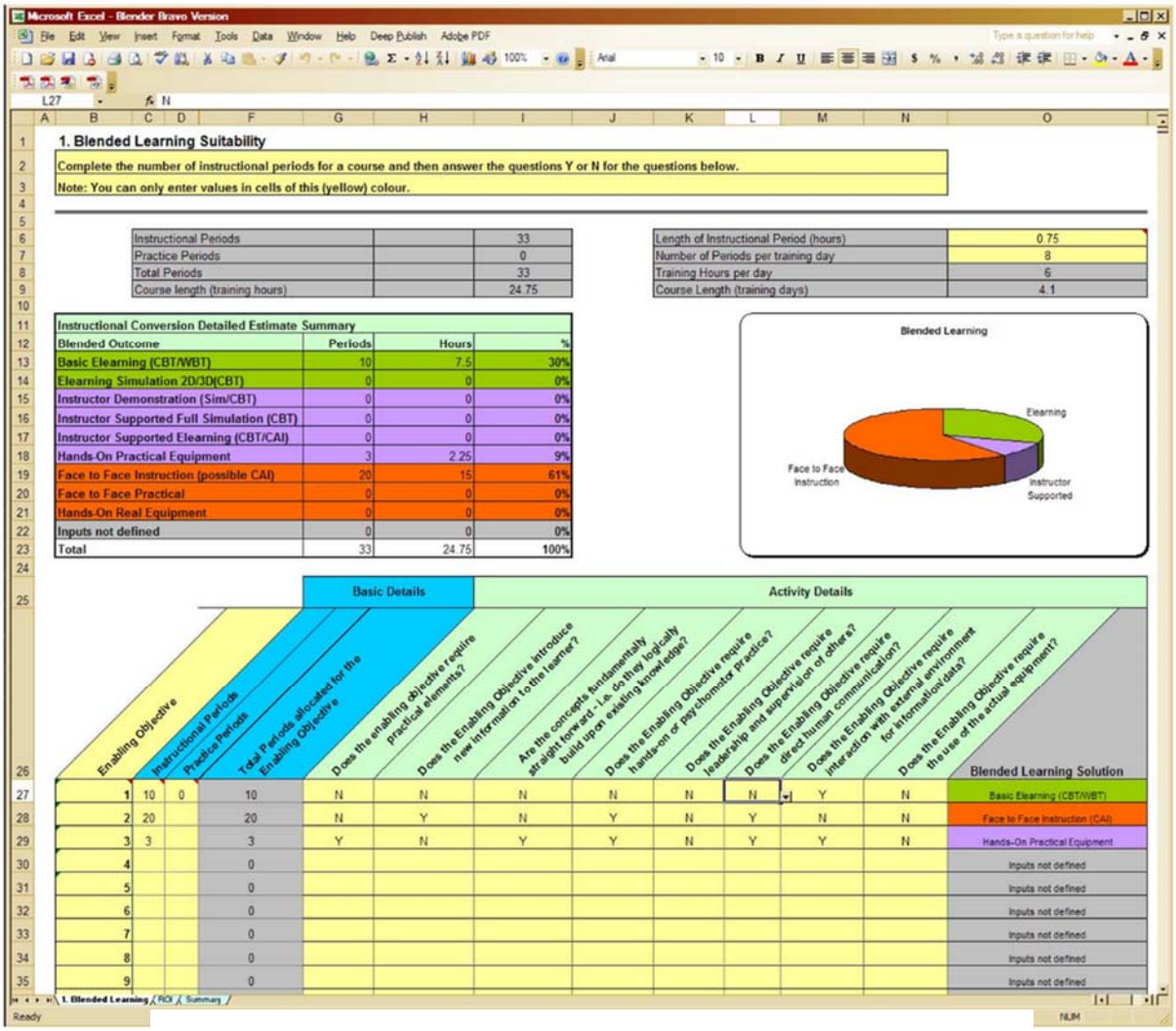
Once a Learning Designer has decided that it is appropriate to incorporate technology into a course the next step is to choose the most appropriate technology. There are many principles but the four most important to remember are (73):

- Incorporating more technology into an instructional design does not always guarantee better learning outcomes.
- Technology benefits must be considered in the context of the particular learning environment in which it will be used.
- The manner in which a technology is presented and used by learners impacts how the technology can be used to promote learning.
- Properly educated instructors can make better use of technology for learning.

The U.S. Army Research Institute have produced 'A Practical Decision Guide for Integrating Digital Applications and Handheld Devices into Advanced Individual Training'(74) that has identified 10 factors and 35 associated sub-factors that need to be considered when integrating digital applications and handheld devices into training. These factors and sub-factors represented key issues in the areas of training methods and delivery, human and contextual factors, and hardware and infrastructure capabilities and constraints.

The NZDF Training Technology Unit produced an application named 'Blender' a blended learning decision making aid in 2007. Blender was based upon simple logic and questions. It was intended to provide guidance to training developers and to be like talking to an 'expert'. It ran in Microsoft Excel (with macros) and incorporated an aid to make sound investment decisions (Figure 10). It was given to the Canadian Defence Academy during a CANZEX exchange and has subsequently been improved and incorporated into their Qualification Standard Management System (QSMS) and Integrated Systems Approach to Training (ISAT) (75). Blender is no longer in NZDF use, QSMS and ISAT have been made available to the NZDF but are not being utilised. Blender has also been shared with UK but is not being used.

[10] Chapter 11



1. Blended Learning Suitability

Complete the number of instructional periods for a course and then answer the questions Y or N for the questions below.

Note: You can only enter values in cells of this (yellow) colour.

Instructional Periods		33
Practice Periods		0
Total Periods		33
Course length (training hours)		24.75

Length of Instructional Period (hours)	0.75
Number of Periods per training day	8
Training Hours per day	6
Course Length (training days)	4.1

Instructional Conversion Detailed Estimate Summary

Blended Outcome	Periods	Hours	%
Basic Elearning (CBT/WBT)	10	7.5	30%
Elearning Simulation 2D/3D(CBT)	0	0	0%
Instructor Demonstration (Sim/CBT)	0	0	0%
Instructor Supported Full Simulation (CBT)	0	0	0%
Instructor Supported Elearning (CBT/CAI)	0	0	0%
Hands-On Practical Equipment	3	2.25	9%
Face to Face Instruction (possible CAI)	20	15	61%
Face to Face Practical	0	0	0%
Hands-On Real Equipment	0	0	0%
Inputs not defined	0	0	0%
Total	33	24.75	100%

	Basic Details			Activity Details								
Enabling Objective	Instructional Periods	Practice Periods	Total Periods allocated for the Enabling Objective	Does the enabling objective require practical elements?	Does the Enabling Objective introduce new information to the learner?	Are the concepts fundamentally straight forward - i.e. do they logically build upon existing knowledge?	Does the Enabling Objective require hands-on or psychomotor practice?	Does the Enabling Objective require leadership and supervision of others?	Does the Enabling Objective require direct human communication?	Does the Enabling Objective require interaction with external environment for information/data?	Does the Enabling Objective require the use of the actual equipment?	Blended Learning Solution
1	10	0	10	N	N	N	N	N	N	Y	N	Basic Elearning (CBT/WBT)
2	20		20	N	Y	N	Y	N	Y	N	N	Face to Face Instruction (CAI)
3	3		3	Y	N	Y	Y	N	Y	Y	N	Hands-On Practical Equipment
4			0									Inputs not defined
5			0									Inputs not defined
6			0									Inputs not defined
7			0									Inputs not defined
8			0									Inputs not defined
9			0									Inputs not defined

Figure 10: Blender work sheet

7. Evaluation

7.1. General Principles

Kirkpatrick and Phillips (76)(77) provide what might be termed the ‘standard’ levels for evaluating training programs. The first four were provided by Kirkpatrick and later Phillips and Phillips added a fifth. Those levels are:

- Level 1 Reaction Focus is on course and instructor,
- Level 2 Learning Gaining knowledge/skills,
- Level 3 Job Application Applying learning,
- Level 4 Results and,
- Level 5 Return on Investment

The Defence Manual of Learning (13) incorporates a variation as follows:

•	Level 1	Reaction	What did the learner's think of the learning solution? Level 1 evaluation identifies the learner's reaction to the learning event and provides a measurement on the immediate response to the learning solution.
•	Level 2	Assessment	Did the learners achieve the learning outcomes? Level 2 evaluation examines the learners acquisition of the knowledge, skills and/or attitudes identified in the learning outcomes.
•	Level 3	Impact on behaviour	Level 3 evaluation examines the transfer of learning to the workplace. It is confirmed by evaluating how the knowledge, skills and attitudes that have been learned are applied and how they benefit and align to workplace requirements.
•	Level 4	Results and benefits	Was there a positive benefit on the organisation and were any performance issues resolved? Level 4 evaluations evaluate the effect of the learning solution on the learner as well as the organisation in terms of value for money, meeting capability outputs sand its ability to meet organisational requirements.

Whatever the method of evaluation employed, there are three reasons why it is important for any new blended learning initiative to be fully evaluated (56).

- Careful assessment of new initiatives and pilots will help guide the choice of options that best leverage available funding.
- Second, evaluation will help the program compete for needed resources to support its expansion. Better documentation of the value of distance learning and its contributions to readiness could be essential to substantiate the case for increased funding.
- Third, evaluation can help identify specific areas for improvement in existing courseware content and delivery, technical matters, course management, training policy, and other aspects of distance learning design and implementation.

But the single most important factor is not a positive student review but an assessment of whether or not the learning was effective. This is often sadly lacking because it is difficult to achieve (78).

7.2. M-learning Return on Investment (ROI)

In the case of m-learning, it is difficult calculate the ROI (60) because exact cost savings or cost avoidance produced by any app will depend on how well a given app is designed, how well it is incorporated into the curriculum, how well the curriculum is adapted to leverage the full potential of the device and software and how well the instructors are prepared to use the app. ROI currently needs to be determined on a case-by-case basis.

On the cost side of the equation, although the cost of developing a single app is not particularly high, the cost of developing and maintaining many apps will be substantial. The cost of maintaining a single App is considerable, the industry norm for software maintenance is about 15 to 20 percent of the original development costs per annum (80). This sort of upkeep may be prohibitive to an organisation such as NZDF. Furthermore, it should be noted that if the Army decides to adopt mobile devices for training on a large scale, it will have to pay not just for the cost of developing and maintaining the software but also for the cost of purchasing devices, providing secure wireless networks, modifying existing curricula, and providing professional development opportunities for instructors.

8. Barriers to Blended Learning

Some of the main barriers to implementing e-learning in the workplace are (55)(78):

- Lack of management support.
- Adopting technologies and systems that are difficult to use and access, are unreliable, and/or lack technical support.
- High up-front costs that include new and/or upgraded systems, training the trainers, and developing interactive and/or personalised content.
- Employee resistance to e-learning.
- Organisations not having an appropriate learning culture in place.
- Employees and trainers lacking the skills and capabilities to teach and learn in e-learning environments.
- Irrelevance to real-time work tasks and not integrated with business processes.
- Limited connectivity. There may be no connectivity (e.g. at sea) or connectivity may be so slow that streaming data is impractical. But there are solutions such using native or hybrid apps, optimising the design of learning content and using / providing local infrastructure,
- Security. The complexity of this challenge arises because it involves the security of data, users, and devices. Again there are solutions to this challenge but they are a significant management problem.

9. Future Trends

9.1. Open Educational Resources

Open Educational Resources (OER) represents a broad variety of digital content, including full courses, course materials, modules, textbooks, videos, tests, software, and any other means of conveying knowledge. OER uses Creative Commons and alternative licensing schemes to more easily distribute knowledge, media, and educational resources, which guarantees that content may be freely copied or remixed, and free of barriers to access, cultural sensitivities, sharing, and educational use. Open textbooks are being considered as a viable means for cutting excess costs with the goal of making education more affordable for students (41).

9.2. Learning Analytics

Measuring learning through data-driven practice and assessment, currently on the rise in universities in the developed world, will reach its maximum impact in higher education in about three to five years, but many leading institutions are moving considerably faster (41).

Our learners need not only detailed knowledge of their specialist subject but the skills necessary to carry on learning and developing throughout their service careers and beyond. They need critical skills to assess new situations and information, reflective skills to consider and develop their activity, and networking skills to function as effective team members or team leaders. Learning analytics should help them to develop these skills (79). Learning Analytics pay an important role in defining learning effectiveness and also offer metrics/data to measure ROI against the high cost of eLearning development.

9.3. Ubiquitous Learning

Schatz et al., (81) provide the concept of *ubiquitous learning* where learning is “pervasive, omnipresent and transparent”. In this concept formal and informal learning are seamlessly integrated and distinctions between training and education, personal development and operational duties are hardly distinguishable. The concept parallels the concept of *ubiquitous or pervasive computing* (82)(83).

10. Conclusions

The concept of blended learning is not new, although the term is relatively recent. Classroom events, combined with supervised practical experience, on job training and possibly some paper based distance learning has been a regular method of teaching for a long time. What is new is the explosion in technology based techniques and tools for learning that has taken place since about 1990. Not since the invention of the printing press has there been such a dramatic change in the options for providing learning.

Like many militaries, the NZDF has been slow to adjust to the possibilities new technologies present. The exception to this is standalone simulators that have been quite widely adopted.

The next generation of NZDF recruits will have been schooled using many of the techniques outlined in this paper. They are not that different from previous generations but they will be familiar with a different set of learning tools and teaching methods. The NZDF should make use of their learning skills.

Training developers and instructor skills will need to change to make use of new technologies. As we gradually move to a more ubiquitous learning environment middle management will need to be aware of their people's learning needs and factor it into the daily routine. Courses need to be fully developed.

Adapting existing material to blended learning can be both costly and unsatisfactory. It is better to apply tailored training techniques to future courses at the outset incorporating key principles and techniques into its design.

Blended learning (specifically synchronised online learning and self-directed learning) has the potential, in a small way, to contribute to opportunities for Military Women by allowing them to further their careers from home.

The introduction of blended learning technologies needs to take into account gender differences.

The barriers to introducing new technologies are many but the key one is lack of management support. Individual training commands and stakeholders cannot put in place the necessary technologies, infrastructure and connectivity without the leadership of senior management and a coherent, properly resourced, NZDF strategic learning plan. The plan needs to:

- Envisage and develop the NZDF Integrated Learning Environment (NILE) that will be needed to deliver Future 35 and beyond.
- Consider and prioritise the physical and technical infrastructure needed to support the NILE.
- Identify the benefits and business outcomes of adopting the new technologies.
- Include both dimensions of competency development, individual and force.
- Include all key stakeholders including the civilian workforce, the uniformed services, Communications and Information Systems, NZ Defence College, the Commander Joint Forces and other government agencies. Without this top down guidance well intentioned ad hoc efforts at unit or service level to introduce new technologies into the learning environment are often destined to fail.

11. Recommendation

It is recommended that a comprehensive strategic learning plan is developed that will define the NZDF Integrated Learning Environment needed to deliver Future 35.

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13. ABSTRACT

Blended learning is not new but the explosion of technology enabled learning techniques since 1990 is new and transforming the possibilities of delivering learning solutions in the military. This paper first defines what is meant by blended learning, then looks at the various learning options and the problems with implementing them. It concludes that most of the difficulties can be overcome but that a top down approach is needed to provide the impetus, infrastructure and direction to realise the business benefits. It recommends that a strategic plan be developed to provide the NZDF Integrated Learning Environment necessary to achieve the Future 35 vision.

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