JSP 822

Part 5: Chapter 5

Defence Training Support Manual 5

Learning Technologies Handbook

Defence Centre of Training Support

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Introduction

Learning technologies *is the broad scope of technologies (including hardware, software and communication networks) that can be used to support, manage and deliver learning.*

(Defence Manual of Training & Education Glossary JSP 822 Part2).

The Learning Technologies (LT) Handbook has been produced to support current LT policy. Its aim is to provide guidance for anyone involved in developing or implementing LT within Defence. Readers are therefore strongly advised to be aware of the policy within JSP 822 Part 3 Chapter 5 (Learning Technologies) before using this document. In addition, it is advisable to read the Defence Training and Education Optimisation Strategy and the Methods and Media Selection Tool User Manual. Links to all documents referenced are available on the DCTS Learning Technologies Website (search: *DCTS LT* on the Defence Intranet).

Each section of this handbook includes practical advice on how effective and efficient LT can be created and implemented. Defence has been using LT for many years and examples of good practice have often been prevalent, however with the large increase in the number of new technologies available, there are now significant variations in both their development and deployment across Defence. In order to bring more coherence to the way LT is applied, this handbook has been written, in consultation with practitioners across Defence, to provide guidance which supports future LT developments and implementations.

The authors (LT Research and Development (R&D) Team) are part of the Learning Technologies Group within DCTS and have been in existence since 2007. At inception, LT R&D was tasked to widen their scope away from just producing simulation programs for legacy aircraft and more towards focussing on becoming the Centre for Excellence for all Defence LT. Since then, the team has trialled a large number of different applications that could be used to develop or manage LT content. One such project was the investigation of a variety of rapid authoring tools which were currently available on the open market (ranging from freeware to high-end authoring tools). Extensive research was undertaken in order to provide back pocket briefs on each tool. This information was

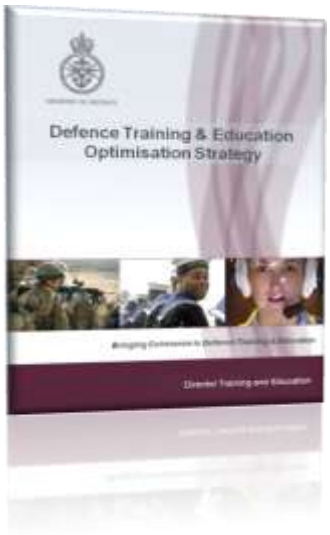
then made available to the rest of Defence and was used to justify the business case for an enterprise licence procurement (currently the web-based tool CourseBuilder by Lumesse). With the addition of extra personnel to the team, R&D were also able to move rapidly into the serious games arena utilising OpenSim to create a virtual DCTS on the local network (a flash based virtual DCTS serious game was also developed for the DLP along with a Chemical, Biological, Radiological and Nuclear (CBRN) game . In terms of social or peer-to-peer learning, R&D LT trialled the first moodle on the DLP, as a community of practice, which was then implemented by the RAF(PMD Air) and more recently the Defence and Army VLEs. The LT R&D team hope that by trailblazing such implementation issues other units will be able to optimise their T&E with greater ease.

For further information and contact details search *DCTS LT* on the Defence Intranet or the Internet (www).

Identifying the Requirement for LT

Other Defence documents, principally JSP 822, describe policy and guidance for the whole DSAT framework including the identification of T&E requirements. Various types of LT media can be considered as possible solutions to T&E requirements ranging from innovative new T&E proposals to an incremental improvement to current methods. These considerations could occur at various stages of the process, however most influence is likely to occur during the Training Resource Estimate or Training Options Analysis phase of DSAT.

For all LT requirements across Defence, an analysis of the most suitable methods and media is to be undertaken and documented before procurement is recommended. Not all LT are suitable for all training and education requirements. In order to select the most appropriate media (such as LT), an analysis of suitable methods is required first. The recommended Methods and Media Selection Tool (MMST)[1] is a simple application which includes e-learning and reference material for this purpose and supports the Defence Training and Education Optimisation Strategy[2]. The MMST provides a simple and fast framework for ensuring that a basic level of analysis is completed before the development or procurement of new LT. The tool is flexible in that it can incorporate, with minimal delay, new underpinning criteria once consensus across Defence is reached. The MMST is best used as a support tool as part of a working group discussion. Ideally this group should include subject matter experts, training/education specialists, course designers and sponsors.



After the methods and media selection analysis has identified possible LT, further guidance may be required. Before planning development and implementation of LT, contact is to be made with single Service (sS) Learning Technology Working Group representatives[3] for advice or, for those Defence units without a sS lead, Learning Technologies at DCTS. To avoid duplication of effort and wasting resources, contact with single Service leads, will allow an oversight of current capabilities. The Learning Technologies Working Group is a forum through which sS leads can then share and capture knowledge across Defence.

[1] MMST details are in the MMST User Manual JSP 822 DTSM 7
[2] The Defence Training and Education Optimisation Strategy is published as a DIN with a link on the DCTS LT website
[3] Single Service Learning Technology Representatives are: D Trg SO2 LT Pol or SO2 LT DD (Army), TBTU OC (RN), HQ 22 Gp SO2 LT (RAF), DLPO Def Ac (Civil Service).

Units embarking on LT implementation projects should aim to engage with other units across Defence who are using similar LT. DCTS Learning Technologies coordinates a spreadsheet of ongoing LT projects across Defence, including contact details, which is available on the DCTS LT website. Units, through their sS reps, should aim to keep DCTS. LT informed on a regular basis so that this resource can be kept up to date.

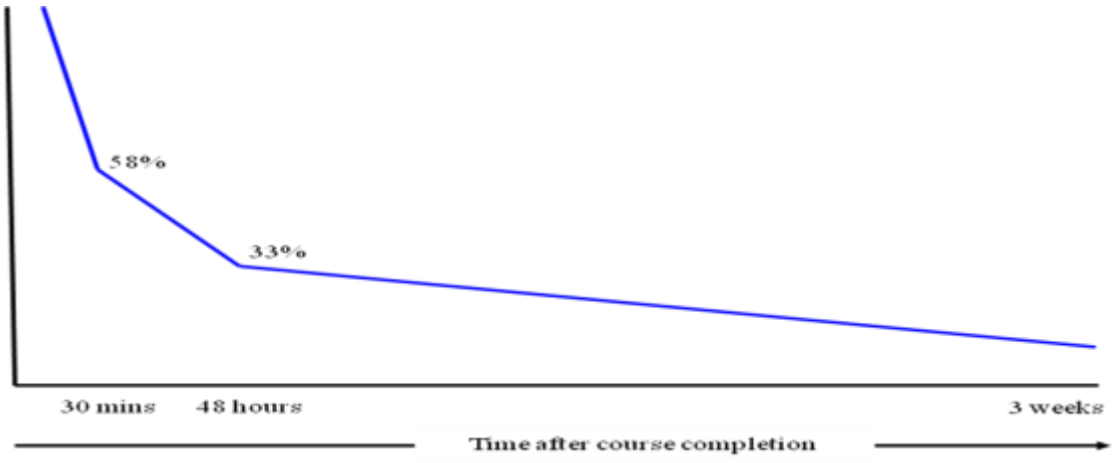
Integrating LT into the Workplace

Integrating learning into the workplace has had many issues over the years; in particular with finding the time to allow staff to go onto training courses. For industry this has been a particular bone of contention because time away from work means a loss in production and this is ultimately at great cost to the company. Although in the military we are not driven by profits, having our staff away for days or even weeks at a time can have a knock on effect to our personnel and managers alike. For the managers, they have to ensure there is sufficient manpower in place to cover the loss of their staff whilst they are away training. For our personnel, time at home in the present global climate is precious, having been away from home due to numerous Out of Area commitments. Nobody likes being away from home for too long and if it is for training, personnel would much prefer to do it at their unit. Another major factor in wanting to integrate LT into your training is that if the new skills learnt are not put into practice straight way then there is significant skill fade. In 1885, Ebbinghaus published his groundbreaking *Über das Gedächtnis* ("On Memory", later translated to English as *Memory. A Contribution to Experimental Psychology*) in which he described experiments he conducted on himself to describe the processes of learning and forgetting.

Ebbinghaus made several findings that are still relevant and supported to this day. Firstly, his arguably most famous finding – is the forgetting curve (see below). The forgetting curve describes the exponential curve that illustrates how fast we tend to forget the information we have learned. The sharpest decline is in the first twenty minutes, then in the first hour, and then the curve evens off after about one day.

To combat this skill fade in the past we would send our personnel on another training course. However, LT allows users to utilise the learning package as pre-course training, initial training or refresher training. Refresher training is particularly useful when the individual cannot remember a certain procedure to follow and needs to refresh their memory of the correct procedures again.

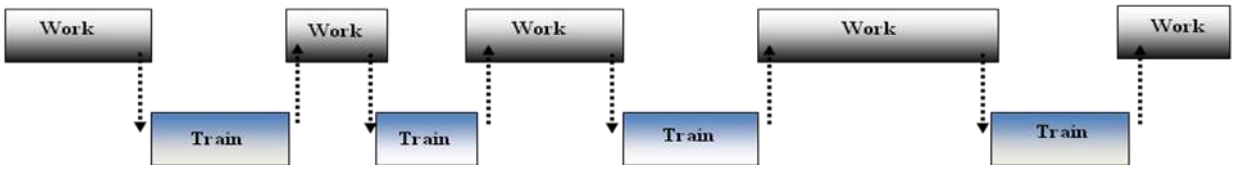
Ebbinghaus Curve - Amount of information retained following a lesson.



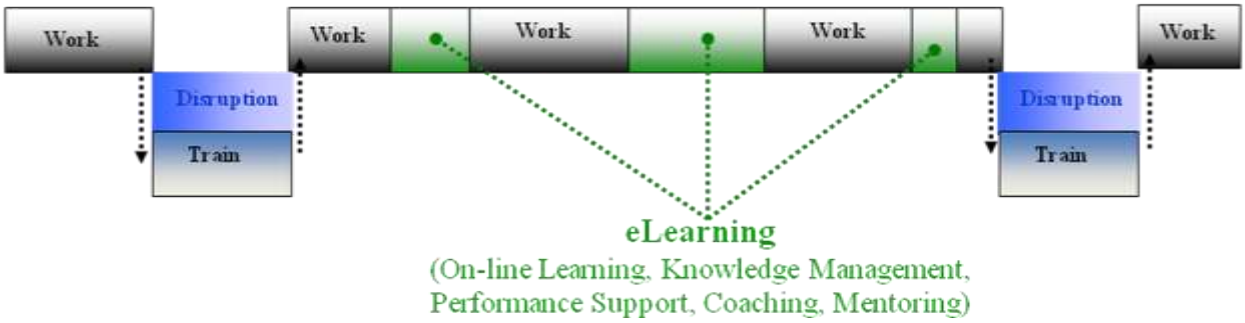
The traditional model of learning (see below) shows there is a great deal of disruption to the learner in terms of going away for training. Compare this with the New Model of Learning (underneath)

whereby if LT is incorporated into the learning cycle, time and disruption to the workforce is greatly reduced. It has been proven that LT aids retention of information through continuous reinforcement and allows the learner to learn new skills.

Traditional Model – Weak Alignment of Work and Learning



New Model – Greater Alignment of Work and Learning



Learning (including LT) is incorporated in the work place

Advantages of LT to the Organisation

There are many advantages for the organisation, instructor and learner when LT is incorporated into the learning cycle and these can include the following[4]:

- **Reduced overall cost** is the single most influential factor in adopting LT. The elimination of costs associated with instructor's salaries, meeting room rentals, and student travel, lodging, and meals are directly quantifiable. The reduction of time spent away from the job by employees may be the most positive offshoot.
- **Learning times reduced,** an average of 40 to 60 percent, as found by Brandon Hall[5] .
- **Increased retention** and application to the job averages an increase of 25 percent over traditional methods, according to an independent study by J.D. Fletcher[6].
- **Consistent delivery** of content is possible with asynchronous, self-paced LT.
- **Expert knowledge** is communicated, but more importantly captured, with good LT and knowledge management systems.
- **Proof of completion and certification,** essential elements of training initiatives, can be automated.
- **Increased availability of training.** Modern LT allows access from a variety of sources such as home PCs and mobile phones.
- **Learners** proceed at their own pace.
- **Opportunity** for personalised learning rather than one size fits all.
- **Increased** level of one-to-one interactions.
- **Instant** task-orientated and personalised feedback. Learners can also respond to the feedback through social learning LT such as forums and blogs.
- **Fewer** training resources.

Advantages to the Instructor

- **Student profiling** – specific weaknesses can be automatically targeted with remedial work.
- **Increased participation** – (if properly designed).
- **Immediate**, individualised feedback.

[4] Disadvantages of LT and possible solutions are covered in the next section
[5] *Web-based Training Cookbook*, 1997, p. 108
[6] *Multimedia Review,* Spring 1991, pp.33-42

- **Student** motivation.
- **Assessment** and monitoring
- **Training** consistency
- **More time** for instruction
- **Safe** training environment

Advantages to the Learner

- **On-demand availability** enables students to complete training conveniently at off-hours or from home.
- **Self-pacing** for slow or quick learners reduces stress and increases satisfaction.
- **Interactivity** engages users, pushing them rather than pulling them through training.
- **Confidence** that refresher or quick reference materials are available reduces burden of responsibility of mastery.

Minimising LT Weaknesses

As with any training program there are always weaknesses. However, if we realize the weaknesses of LT from the outset and do as much as we can to mitigate them, then the LT project will have a better chance of succeeding. To aid you in your design and implementation of LT, a table has been produced to assist you in overcoming some of the issues you may face.

Issue	Possible Mitigation
Motivation of learners	Sell benefits/marketing Break into short modules 4/5mins Support of some kind (e-tutoring) Simple, effective design
IT Skills of audience	Support Taster sessions Analyze situation Understand target level, pre-assess (ECDL) Clear instructions, easy to use
Minimising interruptions	Command chain “buy-in” Schedule learning times Allocate rooms/suite Make managers aware
Technical support required	Test before delivering to user Identify a minimum spec

Issue	Possible Mitigation
	Liaise with SPOC/DLP
Cultural change in your organisation	User friendly systems (KISS) Management support Corporate and employee responsibility Marketing/comms plan
Isolation of learners	Tutor access E-Tutoring Line manager/trainer support
Doesn't suit all learners	Look at "blend" Design – balance interactivity and further reading/research
Cheating	Security passwords Observer/checker
Perceived cost	Show alternatives Sell benefits through a consistent message

Top 10 Tips to keep your Learners Engaged

A varied approach will keep your learners focused and enthused to want more. This approach may include points from the following list:

1. Content is relevant and pitched at the appropriate level, ideally work related and written with the audience in mind. Communicate the benefits.

2. A theme or a story to follow, that includes the opportunity to have the learners interacting with the introduction of questions and activities.

3. Clear objectives that are supported by the content and a logical structure using the stages of the learning process as a guide.

4. Layout that is clear and uses the space well, with considerations for access and functionality.

5. Interactive – is not too text driven. Information is broken up into short sharp chunks of information with a variety of questions and activity pages.

6. Interesting and engaging visual media that is relevant and appropriate e.g. not using animation/video for the sake of it.

7. Good structured layout and content with clear instructions on what to expect and how to navigate around the site.

8. Learner focused and learner is in control of content (e.g. turn off sound / replay a video clip) and easy to navigate.

9. Ability to review (quiz / test) and easily re-visit topic area. Also provide links to further learning / reading.

10. Add the human element for support / motivation.

Rapid Authoring Tools

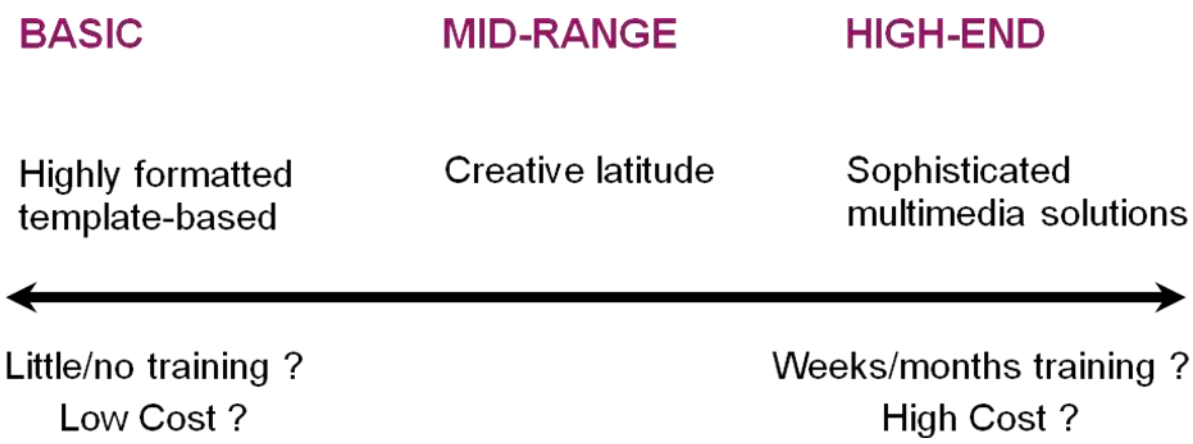
Authoring tools have liberated course developers from their dependence on programmers. Furthermore they enable us to produce and distribute lots of LT quickly, however, quality and effective learning must be maintained – the LT is only as good as its instructional design.

There is a growing problem in the LT industry. Tools are increasingly being used to enable users with little or no instructional design experience to create large amounts of LT. (Reuben Tozman).

What is an Authoring Tool?

"A software application that allows individuals to create their own LT content, without needing to have programming skills." (Brandon Hall Research)

The Levels of Authoring Tools



Basic authoring tools can be classed as follows:

- Template tools requiring little or no training.
- Highly formatted with a course development process that's driven by a sequence of dialog boxes
- Limited flexibility
- For when ease of use is more important than creativity

Mid-range authoring tools can be classed as follows:

- More training for extended creative latitude
- Used to create many of today's LT

High end authoring tools can be classed as follows:

- High-end multimedia simulations with sophisticated graphics and audio

- May need some time to learn
- Lots of creative freedom
- Courses created with these rival computer games - intricate and complex sound and animation sequences

Ultimately you should try and find an optimum balance between ease-of-use features and creative freedom.

There are literally hundreds of authoring tools available on the open market. Some of these are free to download from the web (e.g. CourseLab) but they are not accredited for MOD systems. The current web-based tool available for Defence[7] is CourseBuilder by Lumesse. with licences available from DCTS LT R&D at no cost to individual units. Moreover, DCTS offer training and support with more details available on the DCTS website.

Content Creation Service

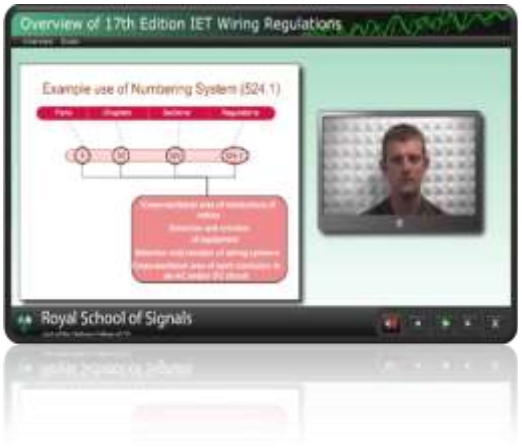
The Content Creation Service (CCS) on the DLP is a web-based application for the development of e-learning. The following paragraphs explain the CCS in more detail:

Benefits

For conciseness the benefits scope has been limited to those accrued by using a web-based collaborative rapid authoring tool for the in-house development of e-learning[8] . The following benefits were recognised during the evaluation phases of the project:

- Compared to bespoke e-learning produced by commercial development companies the cost of production was about 90% less – this includes the capitation rates of the in-house SME developers.

- Development time (flash to bang) was reduced by around 50% by using in-house SMEs. Communication overheads between commercial developers and SMEs were significant due to the specialised nature of most military content. With SMEs doing the development themselves this overhead is eliminated. Collaborative access to content under development also allowed easy peer review rather than the time consuming process of packaging and sending content for review via email (or even CD due to the often large file sizes).



[7] Fully accredited on the DLP Content Creation Service
[8] These benefits are more specific than the wider LT benefits highlighted elsewhere in this publication.

- Content is shared reducing development time even further (this improves as the content and media library increases in size)

- Project management elements such as work flows, quality, configuration management and version control are streamlined and simplified.

- Content is fast and easy to update.

Drawbacks

- License fees for web-based collaborative rapid authoring tools tend to be expensive compared to single-seat clientside[9] apps..

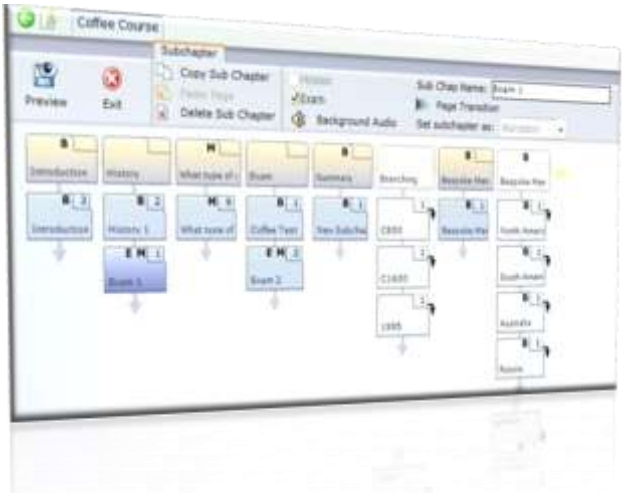
- SMEs need to be released from other duties for content creation (although creation time is not necessarily much more than creating PowerPoint and notes/handout equivalents - which SMEs already do).

- In-house developers need to be trained and supported. Although learning the tool itself is easy (one day), learning the skills required to be a competent e-learning instructional designer can take much longer. Most of the 40 hour blended course delivered by DCTS to all authors is focussed on instructional design rather than how to use CourseBuilder.

- Initially only basic e-learning can be produced in-house however as expertise has matured the levels of innovation and creativity have increased (this is enabled by the sharing of content). Bespoke developers are also used for higher level development such as Flash interactions, 3D models/environments, complex branching scenarios and emulations however these should interoperate with CourseBuilder so that content can be shared and updated.

Benchmarking

DCTS LT R&D attended several seminars and conferences and benchmarked with other organisations who use web-based rapid authoring tools such as CourseBuilder. The most significant difference was concerning who actually created the content. Most organisations created an in-house development team and purchased a limited number of licenses just for this team's use (these organisations included companies such Tesco, Lloyds and the National Farmers Union). As described previously, it is advised that the SMEs themselves should create the e-learning so as to avoid the communication overheads of specialised content. Therefore, DCTS purchased an MOD enterprise license, through the DLP contract, so that all SMEs can develop, rather than just in-house teams. This is similar to the current situation where



[9] Clientside applications are loaded on the user access device (Desktop, Laptop, Mobile Phone etc)

SMEs build their own PowerPoint (yet CourseBuilder is just as easy to learn).

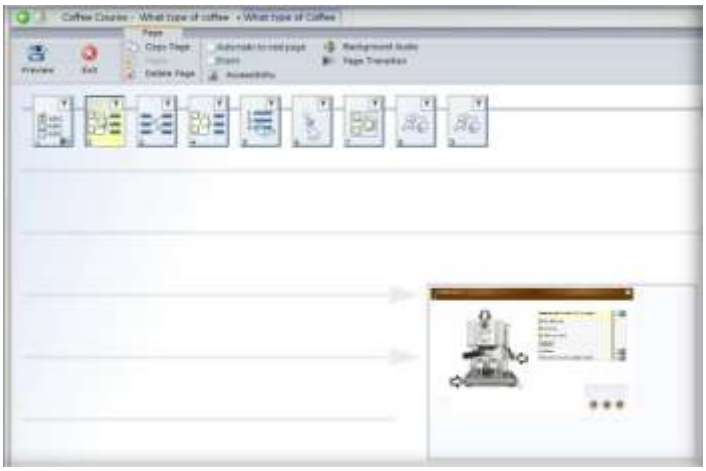
Barriers

MOD regulations were that content would need to be created in a secure environment. This required significant extra costs and time for implementation as, unlike most other organisations, Defence were unable to use the companies' own servers.

SMEs motivation and ability towards e-learning development varied significantly. Many required constant encouragement.

Lessons Learned

Implementation to enterprise status took 3 years which in hindsight was longer than anticipated. One year delay was due to trying to manage the hosting, accreditation and commercial requirements process internally. This proved far too complex and time consuming for the DCTS LT team and consequently the decision was taken to use a commercially managed service at slightly greater cost.



Due to lack of resources, minimal effort was expended on marketing and PR within the MOD. This resulted in a slow take up of CourseBuilder and some units were still purchasing other tools during the implementation.

Design and Engagement

In this section we will be looking at the elements of effective LT design and how we identify engaging materials. Too many times in the past and unfortunately even now, personnel involved in designing LT think that they can just import PowerPoint presentations and convert them into LT. Although there are tools out there that can do this, it is not really something that should be used as the norm and time well spent in the design phase will pay huge dividends at the end. As the statement goes 'rubbish in, rubbish out?'

Firstly, when you are thinking about your project in the design phase you should consider the 4As of LT design as described by Neil Lasher. Lasher states that you should consider the following:

- **Attraction**
- **Attention**
- **Availability**
- **Application**

We will now look into a little more detail on these four concepts.

ATTRACTION – There are 3 things you need to consider when looking at attraction:

Why this and not an alternative?

Easy to use?

Quick to finish?

How do TV programmes keep you hanging?

You have 0.1 seconds to attract a potential learner when a page opens. What can you do to ensure that the learner wants to continue using your LT package?

What draws the user in, engages them and leaves them satisfied? Remember, Attraction will ensure the user wants to use this intervention instead of another.

Easy to use?

The Module should be intuitive

Do they need instructions or is it all self explanatory to use?

Does the LT follow a Logical flow? Are there “traps”?

Quick to finish?

Users gain best knowledge transfer and longer term retention from shorter task related modules. Start to overlap with “Attention” mentioned below.

E.g. Three 5min modules each with a single point will be more effective than one of 15 min modules that cover 3 similar points

In the end, remember to ask yourself the following – “So, what is the attraction for the end user?”

- Knowing how long it is
- Amusement
- Grabbing interest
- Introducing and maintaining a “want”

ATTENTION – to maintain the attention of the user we should consider the following 3 points in order for us to ensure we maintain the attention of the student. These are as follows:

- To the point
- Consider the needs of the user
- Direct information – with links to the theory

To the point – in this area you should ensure that the following are considered:

Modules narrowly focussed to a single learning point (no noise – 7 chunks of info at a time)

Consideration to understanding rather than just simple knowledge transfer

Considering the needs of the user

It should be exactly what the user needs and no more

Avoid frustration and courses being left incomplete

Direct information – with links to the theory

Offer direct information then link to the theory elsewhere, hyperlinks etc.

Keep attention to the point

Provide user with links to further information (which is clearly marked as the theory behind the learning) text books, websites, case studies etc.

AVAILABILTY – look at the 3 points listed below:

- Learn, use, forget
- Up-to-date
- Always re-findable

Learn, use, forget

The Internet changed the way we work (back to back meetings, high volumes of data, ease of access, less time to think).

Information changes rapidly, what's relevant today may not be tomorrow – just in time and workflow models satisfy these issues (people go to the internet to access information required immediately and they tend to use and then forget).

Focus on short term memory rather than long term memory; therefore, focus to deliver information in a way that can be easily and instantaneously transferred by the user to fulfil the need of the current task.

On completion student can forget info as it likely it will have changed next time they need to use it.

As Einstein stated "it's not what you know, it's where to find it".

Up-to-date

Versions should be easily identified outside of the learning (e.g. on an LMS) as change of significant data in the module may be the reason the user is returning not because he wants to relearn the process.

Credibility of your course (links back to maintaining attention).

Important to acquire source code if dealing with contractors.

Always re-findable

Not just the module in the system (or course in the LMS) but also the data in the module.

When the user returns what will they need? More flexibility in what order they can access info – not stuck to the rigid structure a first time user might be forced through.

Every course requires change history page so returning users can see how it was before.

APPLICATION

- What's in it for me?
- Relate learning to the "job"
- Use simulations to practice and test application
- This should have no complications

What's in it for me?

Single most important area is motivation to apply.

Different options for different user circumstances e.g. seniority, experience, and organisational context

Excite the user during the intervention so they will want to use what the module contains

Each module should suggest to the user that they go and use the info they have gained or process they have learned NOW

Relate learning to the job

Provide assessment at the right time and as a separate intervention when the user has had time to reflect, explore the theory or actually use what they have learned in a task they are working on

Assist learner by providing checklists or job aids that they can take away and follow to complete a task

Simulations

How will you implement these design ideas?

How do they compare with what you're already doing?

ANATOMY OF AN LT TUTORIAL

As well as following the four steps as described by Neil Lasher, it is important to look at the points raised below. At the end of the day, if we do not engage our learners and they do not see any relevance as to why they are doing this training, then no matter how good the LT package is, it is ultimately doomed to failure. In this section we will look at 3 areas of LT design.

Ingredients

- Information
- Practice
- Review

Engagement

- Relevance of material
- Meaningful interactivity
- Rich media

Relevance

- Through examples
- Through inductive questioning**.**
- We will now look at these areas in greater detail.

Ingredients

Information: learning material needs to be presented in various ways – text descriptions, diagrams, still images, rich media, interactive graphical media (e.g. 3D models, diagrams with pop up explanations). Make sure you choose the correct media for your students?

Practice: learner needs to experiment with the learning material (NB application) to ensure they fully understand the concepts. This can be done by utilizing the following: test questions, case studies, simulations, games, tasks to perform on-line.

Review: tutorial must provide guidance in response to the students' practical work, e.g. automated feedback or checklist with which the learner can check their own work.

Engagement

Relevance of material: if material isn't relevant to the learner's goals then you're wasting your time and effort.

Meaningful interactivity: concentration of meaningful interactivity is one of the reasons why self-study materials can be so efficient in reducing learning times as these challenges the learner and heightens their attention levels, thus makes it difficult for learner to get into passive watching and listening mode.

Rich media: sound and motion will attract attention but whether it holds it without the aid of relevant material and interactivity has little supporting evidence. Best use is when the learning content demands it (e.g. to explain things that cannot be adequately conveyed using text and graphics).

Relevance

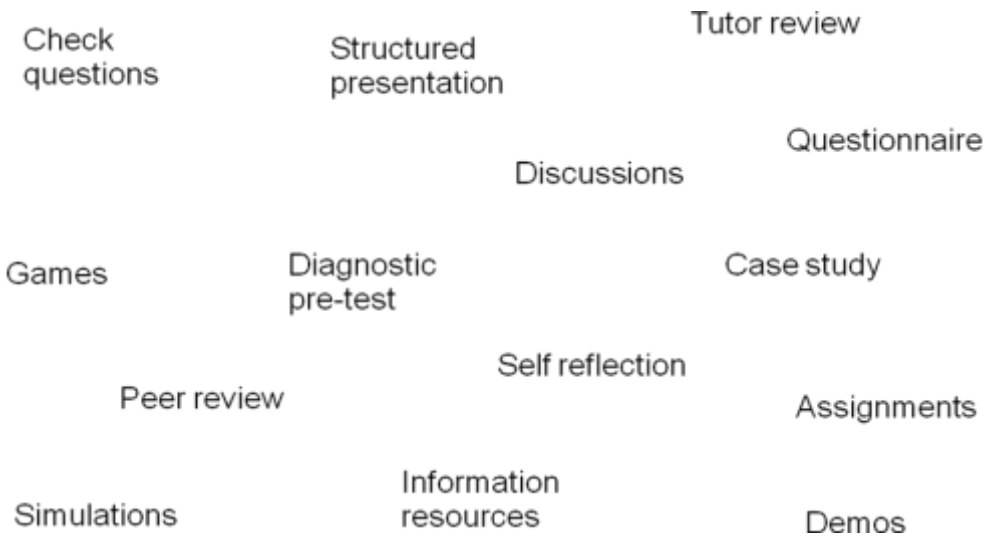
Examples: to clarify concepts, transform abstract info to material that is relevant and applicable.

Inductive questioning: using questions to build on learner's experience and lead them towards the learning point… keeps away from "lecture" appearance.

WHAT IS ENGAGING?

So what is engaging? Take time to consider why film and TV can be engaging, how good instructors can make even the most boring lesson interesting and why you click onto certain websites and stay on them to read the information contained within those pages. Then think about those LT programmes that you have enjoyed and consider what made it enjoyable? How did they grab your attention? Did they use audio, rich media etc? Write down what grabbed and maintained your attention throughout and use them as guides of how you can engage your learners. Another good exercise would be to write down why on the four topics above you have turned a film or TV program off, not enjoyed a lesson or clicked straight off a web site upon opening it and any LT that you have completed in the past which you have disliked. Use these thoughts to ensure you do not fall into the same traps.

To assist you in deciding what engaging activities you may want to include in your LT, a small list is shown below:



Interface Design

In this subject we will take you through some of the basic rules that should be followed to ensure that the look and feel of your LT does not become overtly busy and distracting to the user. If we remember back to when training schools changed from OHPs to PowerPoint presentations, designers and instructors alike had a multitude of actions and sounds going on when a slide was viewed and this distracted everyone. I'm sure you all remember how many different ways text would come onto the screen (typewriter, flying from the left/right/up or down etc) but could you actually remember much about the subject? Unfortunately, the same thing has been happening when individuals have designed LT. Rapid authoring tools are becoming more and more powerful tools with greater scope for exporting your learning over a multitude of media channels to a potentially limitless audience. Getting the interface design wrong means you could quickly lose your learners.

Over the next few pages we will explore the basic rules to interface design and just remember, if you just tweak your layout, colour scheme, text, graphics and audio (if utilised) you could have increased the likelihood of someone reading and remembering your well thought out content!

Layout

The Gutenberg diagram below sets out to explain how the eye travels when reading text. In the West, people's brains are programmed to read from left to right and from top to bottom. Edmund Arnold states that a moving object on a screen will always become a master anchor point for the eye and if the moving object is at the bottom of the page then it becomes difficult for the reader to move their eyes back up to the top of the page. Therefore best practice is to not have any moving objects on the screen once your text is being displayed. Remember, a video or Flash File may look good and display your creativity utilizing these mediums, but to the student it is just another annoying distraction.

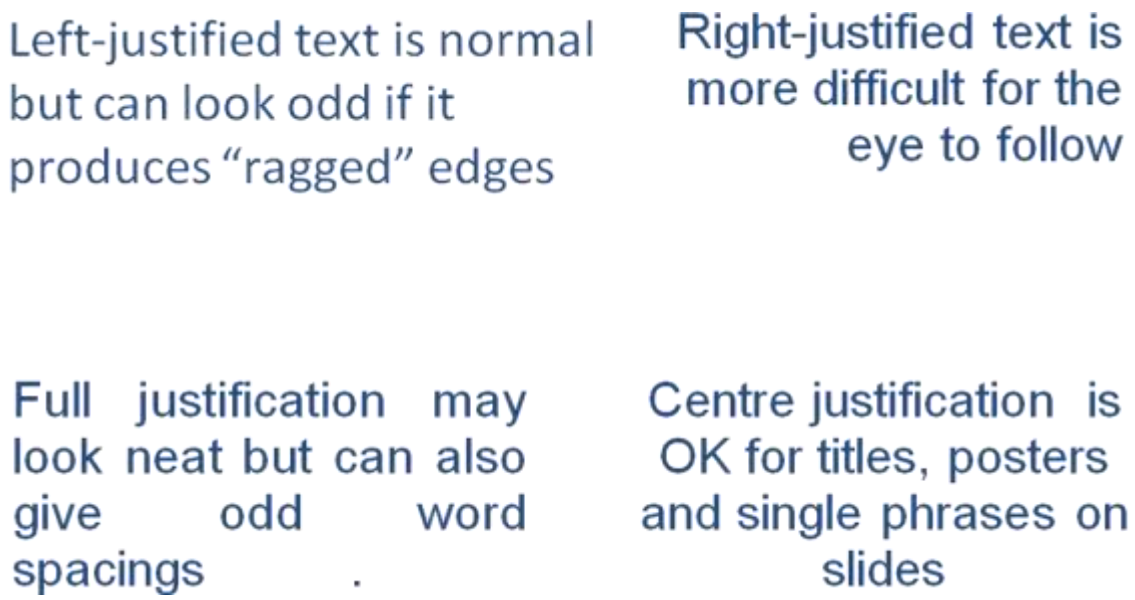
The Primary Optical Area (POA) is where the eye starts scanning from. You want that to be where the start of your info is as the eye doesn't go back after starting at the POA. Moving objects or

engaging images often become the Master Anchor and override the POA, therefore be aware when animation/pictures are introduced, played and finished.

Devices which lead a reader on a wild goose chase, disturb an efficient pattern or cause the slightest measure of distress, should be eliminated (Edmund Arnold). Arnold also insists on design which pays tribute to the linearity of the Latin alphabet and the physiology of the act of reading. Arnold states that any design which forces the reader to work against reading gravity, or fails to return them to a logical axis of orientation, tends to destroy the reading rhythm and should therefore be outlawed.

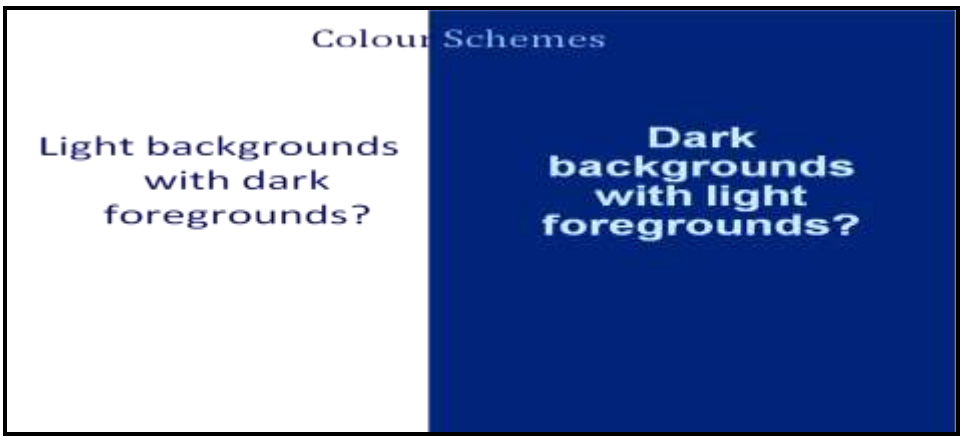
Text Layout

Justification: is the way text is aligned on a page. Advertisers have in the past got this very wrong in newspapers and magazines and unfortunately as we have seen in the past, LT is no different. The figure below explains the reasons for using text justifications.

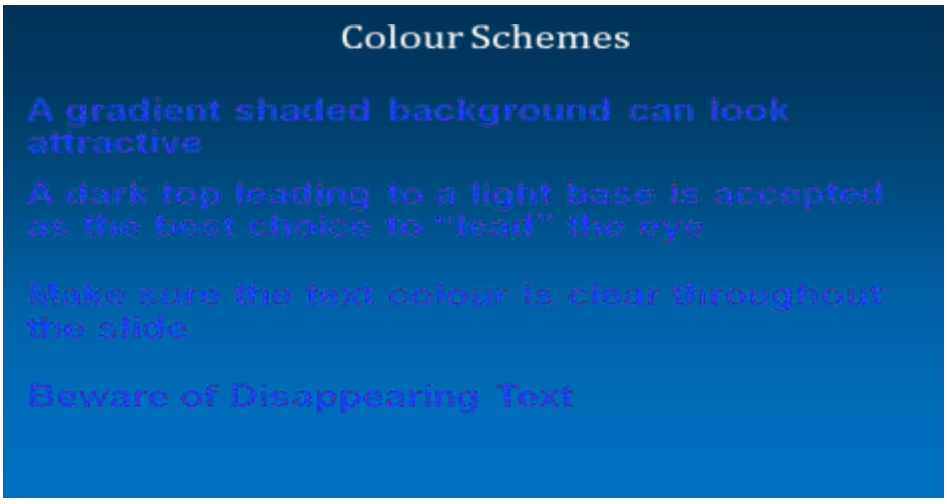


Colour Schemes

When considering colour schemes during the design phase you might find that you are dictated by your organisation of the actual skin and background to be colour used; however, great care and attention should be placed on this element of your design as you will need to consider the needs of those personnel who have specific learning difficulties. Eye strain and clarity of the words can all be affected by the choice of colour scheme. Before publishing the course, get other personnel to look at the screen to see if they have any difficulties reading the text on the page. Some Organisations have been known to allow the end user the ability to change the screen background colours for themselves. This is easy to do and something you may wish to consider. Below is an example of different ways in which to present text onto light and dark backgrounds. 9 out of 10 people will prefer a dark background and lighter text as the words are clearer and easier on the eye to read.



Another consideration is whether or not to have a gradient shaded background as seen in the figure below. This type of background can look attractive and the dark top leading to a lighter base is known to help draw the eye down the page. However, be careful of text clarity in particular further down the page.



Text and Colour

Approximately 8% of males are colour blind whereby red and green is the most common form of colour blindness. You will find that similar colours can contrast quite well, but be aware that background patterns can make life a struggle to read the text see below. A safe bet is either yellow on blue or pastel coloured background with black text. Although gradients can aid drawing the eye down the page, be wary of the style you are using and not to introduce a Moiré Effect[10] whereby the image will blur and reduce overall clarity as seen below.

Colour – Things to remember:

- Don't use too many different colours, particularly for text. You should try to aim for no more than 4 colours.
- Once set of colours have been chosen stay consistent throughout.
- Colours have association, Red = Stop, Green = Go etc see below
- Remember, wrong colour = wrong message and associations can build up in a program e.g. one colour text for correct feedback and another for incorrect.

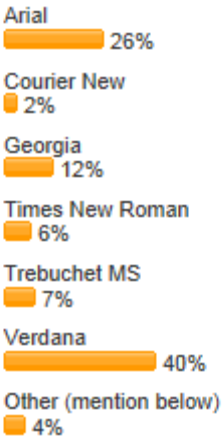
[10]Visit http://www.mathematik.com/Moire for a visual demo.

- Don't use too many colours - people get confused
- Be consistent
- Colours have associations:

House Style

A house style can be the easiest way to remain consistent throughout. By setting up your house style at the inception of the design phase you can ensure that you have the correct colour scheme, logo, text style and layout set for the rest of the presentation. More information on MOD style guides is available from Defence Media and Communications on the MOD website.

Font Type and Size. Now you have your house style squared away, it is important that you choose the correct font type and size. Again it is imperative that you remain consistent throughout. Below are the results of a survey[11] which asked which are the best fonts for screen reading (as opposed to print). The most popular was Verdana followed by Arial , both of which are sans serif (without the small extensions to the letters which often are blurred by screen pixels).



In terms of font size, when using text for describing events (not headings) it is best to use a minimum of 12pt font with 14pt spacing as this is what the brain is use to reading.

Should I use Double Spacing?

In terms of using double spacing, the brain finds this confusing, remember, in LT only 4 sentences can be read before the eye becomes tired.

Text Emphasis

To emphasise your text there are various ways in achieving this. You may decide to enlarge the text you deem important or **embolden**, underline, add shadow, a different colour, use UPPER CASE or use animation to grab the attention of the user.

[11] http://www.twiigs.com/poll/Technology/Internet/12586

In the main, underlining, use of capitals and animation should be avoided. Bold or adding colours are the best methods to emphasise words; although, care should be taken when using colour as words coloured on the internet have association with a link to further information.

Integrating Text and Graphics

The use of text with graphics is a very good way of reinforcing the information you are trying to impart onto your students. By putting text either close to the graphic or better still as part of the graphic it is referring to (see figure below), ensures that the student does not just look at the picture. Please remember the picture will become the master anchor point (refer to the previous Gutenberg diagram) and any text placed above will have the chance of not being read.

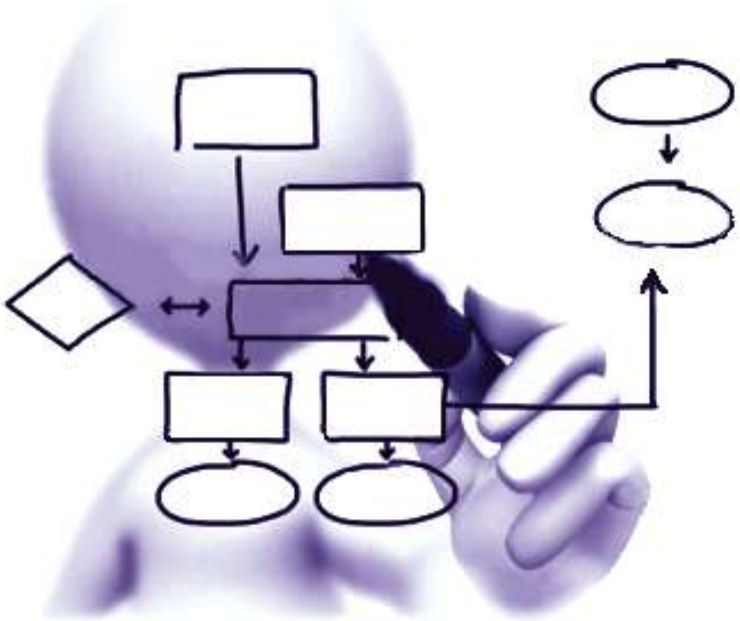
Integrating Audio

Should audio be used in your LT? This is a question commonly asked and one where due care and attention should be given. As a rule of thumb, if the audio does not enhance the training then do not use it! However, if it is deemed important, then you need to consider if you should have just narration or narration with on screen text. It is worth considering that words presented by audio are better than on-screen text especially when they are describing an on-screen graphic. This is because essentially you are spreading the input over 2 channels rather than competing for the use of just one. However, some people do not like reading the text whilst listening to the audio, or, do not like having a voice over whilst reading the text. Therefore the ability to turn off text and or audio should always be made available. Probably the best way to use audio and text is to introduce key bullets of text at the appropriate points in the audio narrative. This will help to reinforce the learning points without overloading the learner. One final thing to consider is the use of voice. Computer generated voices are generally a no-go and you should always consider the use of a human voice. However, the quality of text to voice applications are improving all the time and could meet the requirement in the near future.

Simple Tips for Designing LT.

Below are some simple tips when you are looking at designing your LT. This list is not comprehensive and should only be used as guide.

- Keep it simple – text, sound, motion, colour, etc. should be used to support the instruction. If it doesn't support it – remove it. Resist the urge to show off your cool new skills.
- Provide a harmonious and consistent variety of text, sound, motion, colour, etc. to keep attention and avoid learner distraction.
- If using simulations or problem-solving interactions, replicate the real work environment as much as possible.
- Graphics/pictures should support the instruction and reinforce a message, not just provide superfluous filler.
- Limit the amount of text on a page. See http://www.useit.com for some usability guidelines.



Learning Technologies Checklist

The following 12 Key Themes provide a checklist and focus for project teams when developing a Business Case for LT. The themes are based on our current issues and will enable a coordinated approach to achieving successful outcomes. Further detail is available in JSP 822 Part 3 Chapter 5.

Identify Benefits. Focus on tangible benefits which have been rigorously analysed. Ensure that the benefits are managed, evaluated and realised.

Examples of metrics for measuring benefits include:

- Improved performance.
- Reduced costs.
- More choices for learners.
- Increased availability to learning.
- Decreased time to competence

The metrics will need to be quantitative wherever possible and will be used to measure the success of a project.

Improve Culture. Many personnel are apprehensive about new technologies, often based on convincing reasons. These include perceptions that LT will threaten current effective methods of learning delivery and if implemented will create more work or problems. The proliferation of new terminology exacerbates inconsistencies in how the new technology is interpreted and applied. The following describes examples of how TO can be managed so as to increase the likelihood of cultural acceptance.

Blended learning solutions should be introduced to new recruits at the earliest opportunity and then continue throughout their career. It will also be necessary to train course designers, training deliverers and line managers in the use of blended learning solutions. Blended learning will reduce residential training and time away from work however, there needs to be recognition by the chain of command that "learning" is a fully accepted and supported workplace activity. Creating the right environment for blended learning to take place, at work or elsewhere, will be key to cultural acceptance.

Easy access to blended learning will need to be made available and then communicated to all Defence personnel. Examples of benefits and good practice should be shared regularly and used to drive future policy and guidance. Eventually a blended learning culture will emerge where all personnel naturally use the most appropriate learning media technologies. These resources will then become the norm in the same way that whiteboards, OHPs and MS PowerPoint® have been in the past.

Maximise Interoperability. The MOD often uses outdated technology infrastructure and applications which can constrain implementation options. There are now however, more companies prepared to work with legacy systems allowing them to interoperate with each other. Cost effective integration of new technologies with old is therefore much more feasible than before. LTs should be compatible with our existing MOD technologies and be flexible enough to interoperate with future innovations. Although DII is aiming to standardise our infrastructure, there are still over a thousand Defence networks and systems with varying capabilities for processing and bandwidth. DCTS LT can advise on which media are most likely to perform as expected. Trials of new technologies should be conducted and evaluated before any procurement.

Maximise Availability. The aim is to make LT available to as many Defence learners as possible - 24/7. The DLP is therefore the default delivery mechanism to support Defence-specific LT unless local IT infrastructure is not capable of providing access. Delivery via the DLP will enable both internet and intranet (DII) access at anytime. This will support more learners with more freedom to learn when they wish.

Meet Security Requirements. The need to satisfy security and accreditation requirements is a major constraint which will limit the implementation of many emerging technologies. Before new technologies or contractors are considered (especially if web-based) an accreditor should be consulted. The MOD has stringent rules which must be adhered to and no funding should be committed before accreditation has been agreed. The accreditation process is both expensive and time consuming and should therefore be started as early as possible. Contact your local unit CIS Security or the Defence Security and Assurance Services (DSAS).

Meet Commercial Requirements. MOD Commercial branch requirements must be followed when procuring LT. The default approach should be to select methods and media which can be achieved using resources already available within Defence. These include the DLP, a Rapid Authoring Tool for e-learning development (CourseBuilder) and VBS2 for multiplayer simulation and serious games. If justification can be made to outsource, then either the MOD or the OGC Buying Solutions Enabling Agreements should be used. Contracting outside these agreements necessitates a full requirement process iaw Commercial Branch regulations which can take several months.

Align with the Defence ICT Strategy. LT falls within the scope of Information and Communications Technology (ICT). The Defence ICT Strategy (dated 29 Oct 10) provides high level direction for investment in, and use of, ICT to best enable achievement of Defence's goals through a common value for money approach that supports local accountability. Further details are available by searching on the Defence Intranet within Information Policy and Services.

Manage Learning. A holistic approach to the management of learning and content which may include: centralised catalogues of courses, scheduling, tracking usage, auditing, repositories of

resources and e-portfolios. Ensure that the requirements for the management of learning are clear and that capabilities within the DLP are analysed before considering new procurements.

Ease of Use. New technologies should be easy and fast to develop as well as simple for learners to use without complex training. Quick to learn Rapid Authoring Tools are available for all MOD employees although it is accepted that certain complex LT, such as full-scale simulators, may require contracted specialist developers.

Reduce Costs. Defence should maximise the adoption of LT which show the potential for a clear Return On Investment (ROI) whilst maintaining or improving current performance. Initially, investigation must be carried out of existing packages within the MOD (or allies who share content with us) and cost effective prebuilt packages from commercial suppliers (Commercial/Government Off The Shelf – COTS/GOTS). These should be tried and tested media with reduced risk and value for money. The ability to modify or repurpose such resources should be requested from the suppliers. In-house development is the default approach for requirements which are outside existing COTS/GOTS packages. Training exists within the MOD and the communication problems of working with contractors are eliminated. Units may be constrained by the lack of availability of in-house developers which could make certain options impractical. However, in recent years many technologies have become far simpler to develop with training and support now available within Defence (DCTS LT run an In-House Developers Course: No 3004). Using a contractor for new technologies is only justified if in-house development is not feasible and no existing technology or media will meet the need.

Select Methods & Media. Defence must aim to define the specific methods and media which are most suitable for the wide variety of training or education that is delivered. Further details and guidance are in the Methods and Media Selection Tool Manual (JSP 822 Part 5 Chapter 7).

Deploy Good Practice. Defence needs to recognise LT good practice in order to drive future policy, guidance and strategic planning. There is now a suite of documents available on the DCTS LT website which contain guidance and examples of good practice.

The Defence Learning Portal (DLP)

The DLP provides an important capability that enables many LT benefits to materialise and mature. It sits at the heart of the future strategy; providing a platform for the hosting of LT courseware, designed for delivery over the Internet or the Restricted LAN Interconnect (RLI).

The DLP is a 10 year Defence & BT partnership project that commenced in 2004; It includes Web2.0 technology; thereby providing learners with the opportunity to learn in a collaborative manner by sharing knowledge through forums and wikis. There are currently 173,000 learner records on the DLP; each of them contributing to the forums and over 754,000 learning instances as a result of accessing many of the 1100 courses.

The central component of the DLP is a Learning Management System (LMS) based on DOCENT 6.5 software. This software provides the functionality for delivering and recording learning activities in an individual learning account. It also provides training co-ordinators with the ability to manage students, resources and courseware.

DOTNETNUKE™

The second major software component of the DLP is DotNetNuke also known as DNN; this is an open source Web Content Management System that provides the DLP team a web framework for managing the overall site. It also provides the web2.0 functions such as forums and wikis.

A screenshot is shown below that demonstrates the menu options that will be viewed by a Learner when entering into the ‘My Learning’ section of the LMS.

Learning Plan View

The screenshot below shows the menus available to a training co-ordinator. It can be seen that it is possible to enrol students on courses and view progress on learning activities. Actions that you may expect for someone fulfilling a training co-ordination role.

Training Coordinators Menu

Procurement of LT Checklist

The following list is a guidance checklist when considering the procurement of LT whether Commercial Off the Shelf (COTS) or by bespoke contractor developments.

1. Use COTS if you can get 80% of the requirements. It will be faster, cheaper, less risk and come with better support and maintenance. Find another way of training the other 20%.

2. Make sure that the requirements are clearly defined. Do not assume anything of your supplier. (But don't spend an age on the Requirements Analysis before going to prototype - capture 80% of the Requirement then amend as you go).

3. Do not 'solutioneer'. The requirements should be defined BEFORE solutions are discussed. Unscrupulous suppliers might be tempted to offer a solution too early because it offers them a greater profit margin. This could lead to a less than optimum solution for your requirements.

4. Involve all stake holders as early as possible in the process. Sponsors, instructors, students, assessors, accreditors and managers all have a role to play.

5. Appoint an intelligent customer from within the MOD to act as project assurance. Someone who has experience in both LT development and project management would be ideal.

6. Follow a project management methodology such as PRINCE2. This will ensure that the project is correctly planned monitored and controlled.

7. Use web 2.0 facilities such as chat and forums to communicate and document issues.

8. Ask for the ability to update the LT yourselves rather than have to pay the suppliers again.

9. Ensure that all MOD accreditation and security requirements are followed. JSP 440 Section 8 gives guidance.

10. Try to make the LT as flexible as possible in terms of which platforms it can be delivered on (web, CD, mobile etc).

11. Do your research into which type of LT will be most suitable for your project. (simulation or emulation, theory or practice, 2D or 3D, etc).

12. There is an LT framework agreement owned by DA-CMT (Defence Academy) - it involves key commercial suppliers and enables single source contracting to fixed pricing. Another option is to use the Office of Government & Commerce, Buying Solutions Enabling Agreements. (Search OGC Buying Solutions on the Internet).

13. Remember that getting the technology in and functioning is only one aspect of the change management required to introduce LT or learner led learning - change management and cultural issues are vital to long term success.

6 Levels of a Learner[12]

School leaver

- games orientated
- lots of animation
- engaging and completely fun
- not interested in video (unless short U-Tube type clips)
- simple words, single syllables
- read first paragraph then move on
- ignore scroll bar
- read 3 bullet points and won't go to fourth (therefore create more screens!)

Blue collar

- scroll to see how long the paragraph is then go back to the top and just read what they can see
- read 4 bullets but no more than 6

White collar

- less animation
- more content to watch whole video
- happy to play scenarios
- read 6 bullets
- more text
- less animation

CEOs

- Almost no animation
- Don't mind scenarios (happy to test in safe environment)
- Best video watchers (although won't just be watching it)
- 4 bullets
- short time span, no games

Strategists

- 16 bullets
- complete book in a scroll box but they'll want to print it out
- no animation

[12] New Scientist magazine 2007

- no games
- no video
- look at diagrams
- not much comedy, want hard facts

PhD

Don’t like LT and don’t want to use it

- brain’s working too quickly to sit down
- can multi task

Media List

In this section Learning Technologies Media are listed with a description, advantages/disadvantages and examples. Use the search facility (in Word or PDF) if you are seeking a specific LT. Traditional media (such as Classrooms and Handouts) are also listed to ease comparison when carrying out methods and media selection.

Audio Media

A variety of formats for delivering sound either through speakers or headphones.

Advantages:

- Cheap to produce.
- Easy to update.
- Realistic.
- Easy to operate.
- Flexible.
- Realism.
- Does not disadvantage poor readers.
- Uniform instruction.

Disadvantages:

- Must provide realistic representation of environment.
- Pure audio has low retention rate compared to other media, best used in conjunction with other methods and media.

Examples

- Tape
- CD
- MP3
- Podcast

Augmented Reality

A combination of a person's real world view and a computer generated virtual scene that augments the world with additional information.

Advantages:

- Can negate the requirement for a tutor.
- Allows GFE to be supported electronically.
- Can be used at point of need.
- Material may be reusable as a job support aid.

Disadvantages:

- Cost of hardware, software and development.
- Currently immature technology.
- Long development time.

Examples:

- Heads Up Display.

Chat Room

Synchronous texts chat between students and instructors in an online environment.

Advantages:

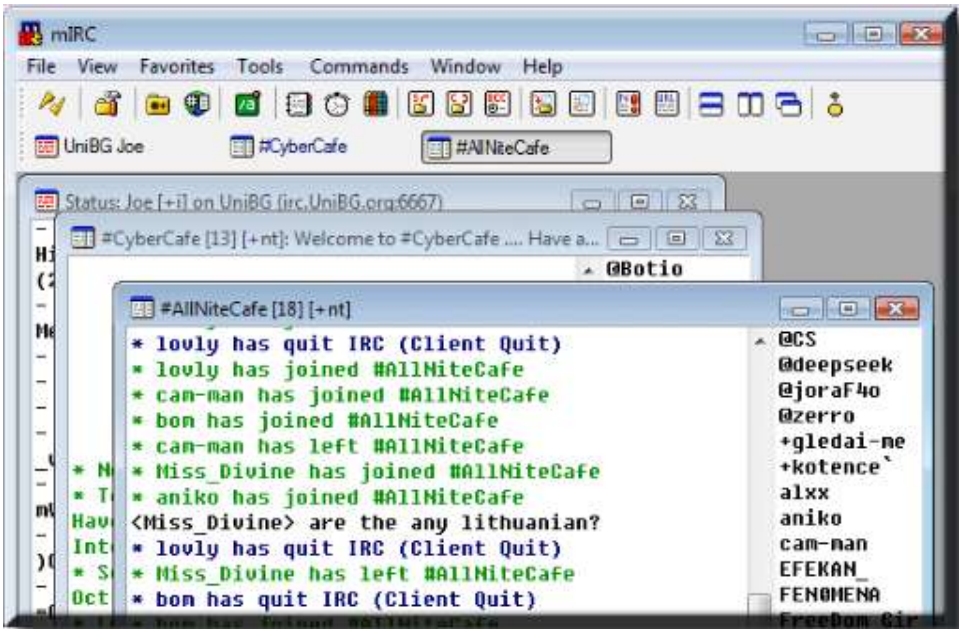
- Synchronous text communication over the web.
- Easy to learn and use.
- Retains a record of the discussion.
- Low bandwidth requirement compared with video and audio.
- Open source (free) chat software available.

Disadvantages:

- Requires fast typing skills and literacy.
- Easy for discussions to get out of sync and participants to get confused.
- Needs to be monitored and controlled.
- Requires specific skills for instructors or facilitators to ensure maximum participation.

Examples:

- MSN.
- Moodle Chat Room.
- MIRC (see below).



Classroom*

Physical building for training with a capacity of normally up to 30 students.

Advantages:

- Inter-personal allowing physical interaction amongst instructor and students.
- Allows clear sight of body language.
- A more comfortable environment for "technophobes."

Disadvantages:

- High initial purchase cost.
- Ongoing maintenance costs such as equipment and utility bills.
- Requires students and instructors to be in the same place at the same time.
- Number of students limited by the size of the classroom.

*For the purposes of the MMST, "Classroom" media combines all types of training and education in a building.

Examples:

- Theory Classroom
- Workshop
- Laboratory
- Syndicate room

Computer Assisted Instruction

CAI is the use of a computer as an aid to the instructional process. The computer is usually under the control of the instructor. Included in CAI are electronic reference databases of various forms of simulations, and electronic presentation media.

Advantages:

- Flexible. 2D or 3D.
- Good for demonstrating complex dynamic systems. PowerPoint slide shows are quick and easy to produce.
- Slide amendment easy.
- Constant good quality.
- Allows complex drawings to be broken down or exploded thus simplifying the underlying principles behind the system.

Disadvantages:

- Cost increases with complexity, especially dynamic productions.
- Computer literacy and resources required to produce and execute.
- Can be boring if used too much.
- With CAI, there needs to be an instructor present if learning transfer is to be guaranteed.
- CAI does not replace the human tutor, it merely assists them.

Examples:

- PowerPoint
- Prezio
- CourseBuilder

Computer Based Training (E-Learning)

CBT is the use of a computer as an interactive device with an embedded training strategy in which there are specific programmed responses that seek to aid learning. The computer primarily acts as a tutor/instructor and the trainee interacts directly with the computer.

For this guidance document, CBT and e-learning are considered to mean the same. There is significant variation in interpretation of the definition of e-Learning.

According to the Defence Training Review of 2001, the Defence definition of e-Learning is as follows:

"The collective term that encompasses web-based structured learning using computer and communications technologies delivered anywhere and at any time it is needed or desired"

Hence e-Learning is a collective term encompassing many of the other media in this document such as m-Learning and Social Networks.

Most people think of e-Learning as online courses such as those on the DLP. JSP 822 defines this as Computer Based Training (CBT) or Web Based Training (if over the web). See the Web Based Training section in this document for more information.

Advantages:

- Individualized tuition.
- Student centered and self paced.
- Maximum trainee involvement in responding to stimuli presented on the screen.
- Consistent quality of instruction.
- Student retention of material can be high.
- Lots of COTs solutions available.
- Good for students with low motivation. CBT (such as quizzes and games) can be tailored to learners preferences.
- Suitable for mixed ability groups.
- Suitable for teaching procedures and knowledge based learning outcomes.
- Ideally suited to stable course content.
- Immediate feedback to students.
- Suited to procedural and knowledge based training.

Disadvantages:

- Requires careful analysis and design.
- Can become dated very quickly.

- If trainees reading ability is limited, then it may not be feasible to use simple CBT.
- Long development time.
- Assumes student population is computer literate.
- Possible aversion or fear of learning through this media.
- Not suitable for physical skills training.
- Costs increase with complexity.
- Lack of human interaction.
- If linked to platform equipment may require to be updated in accordance with incremental acquisition programme.
- May lose validity if “running” slower than latest application.
- Can be used for attitudinal training if scenario based and media rich.

Examples:

- Basic Page Turner.
- Rich media files.

Levels of Interactivity for CBT (E-Learning)

Level 1 interactivity

Text, photographs chosen from library, static graphics, simple effects, “test your understanding” quizzes, linear structure or simple branching, limited/no audio.

Level 2 interactivity

Engaging text, graphics and animations with/without audio, text and effects, some specific photography, interactive scenarios with games/quizzes.

Level 3 interactivity

Bespoke photography and video, audio, branching navigation and immersive scenarios, highly-interactive games/quizzes.

Level 4 interactivity

Fully animated, complex branching navigation, immersive 3D model based e-learning incorporating latest technological advances in e-learning.

Emulator

A simulator which is constrained to respond in a predetermined manner. Such computer- based devices may be used in CBT or CAI modes. They do not have to be high fidelity representations of the real equipment.

Advantages:

- Allows students to experience and gain idea of actual situation.
- Environment and teaching situation controlled.
- Can be less expensive than a simulator.
- Emulator trained personnel perform well on transfer to operational equipment.
- Can provide cues associated with forced feedback mechanisms.
- Best results are obtained if students use real equipment shortly after emulation training.

Disadvantages:

- Can be expensive.
- Requires intelligent tutor to brief, monitor, and debrief for learning transfer to occur.
- Incremental acquisition may require several updates of software.
- Operators trained on emulators may not be initially as fast as operators trained directly on the equipment.
- Usually requires some training on GFE after emulation.

Examples:

- Flash Instrument Trainer

Emulator built in Flash for Navigator Training

Electronic Performance Support System

An electronic device which provides information, software tools and procedural knowledge, already available within the organisation, to an employee at their moment of need, in order to enhance their performance of the task in hand.

Advantages:

- Reference material available as a result of Def Stan 00/60.
- Provides reference and learning material at point of need.
- Job aid, which also facilitates learning while doing, with high probability of transfer.

Disadvantages:

- Cost.
- Hardware specification must support EPSSs.
- CBT material requires careful analysis and design.
- Not suitable for initial training.

Examples:

- PDAs.
- PSPs.
- Netbooks.

Forum

An online website where users can create and reply to text based discussion threads asynchronously (not in real time).

Advantages:

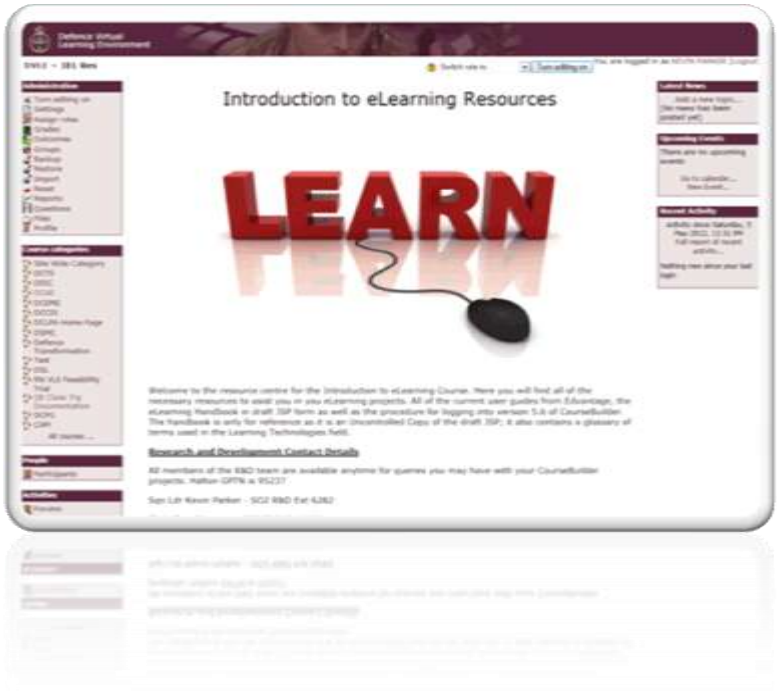
- Discussions are captured for others to review and partake.
- Easy to set up.
- Easy to teach who to use.
- Allows sharing of a variety of media such as docs and graphics.

Disadvantages:

- Needs to be monitored.
- Can spread bad practice if not controlled.
- Requires certain knowledge of IT and the web.
- Users may need to be motivated to post on the forum.

Examples:

- Bulletin Boards.
- FAQs.



Government Furnished Equipment

In a training context this is the taken to be the actual equipment found in a unit or on a platform.

Advantages:

- Students can use the real thing and gain first hand experience. Usually updated through incremental acquisition.
- High Fidelity.
- High credibility.
- Able to train all learning outcomes.
- Good for emotional fidelity (inducing stress, fear).

Disadvantages:

- Cost.
- Size.
- Support services.
- Convenience.
- Mobility.
- Maintainability.
- Health and Safety restrictions.
- May support training in small groups only.
- May not be available when required.

Examples:

- Live computer database.
- Training on actual aircraft.
- Training on real hydraulic systems

GFE With Embedded Training

Training that is provided by capabilities built into or added onto operational systems, subsystems, or equipment, to enhance and maintain the skill proficiency necessary to operate and/or maintain that equipment.

Advantages:

- Training environment provided with the real equipment.
- Allows perishable skills to be practiced.
- May be updated with operational equipment updates. Reduces training time away from unit.
- Both refresher and continuity training are resident in the unit or ship.

Disadvantages:

- Expensive to fit to legacy equipment.
- Decision to provide embedded training should be made prior to design freeze of GFE.
- May support training in small groups only.
- May place added burden on processing capabilities of host processors.
- May increase wear and tear.
- Equipment may be operated in training mode rather than operator mode & vice versa.
- Possibilities offered by embedded training may be limited because of operational security.

Examples:

- Built in Tutorials
- Training "mode" on real equipment

Example of embedded training from Presagis ©

Modified GFE

In a training context this is the taken to be the actual equipment found in a unit or on a platform that has been altered in some way to replicate only those key tasks that require training.

Advantages:

- Reduced maintenance costs.
- Negates some Health and Safety restrictions.
- Extended life expectancy.

Disadvantages:

- Cost.
- Size.
- Convenience.
- Mobility.
- May not be available when required.
- May support training in small groups only.

Examples:

- Stripped out aircraft for airframes engineers

Handout

Paper resources given to students to support their learning.

Advantages:

- Can speed up course time, replacing note taking.
- Can be read in student's own time.

Disadvantages:

- Lesser degree of recall compared to notes written by student.
- Cost of printing.

Examples:

- Handouts
- Books

Interactive Electronic Technical Manual (IETMs)

An electronic instruction manual a book on a computer that describes how to operate or maintain a product.

Advantages:

- Provides reference material at point of need.
- Job aid rather than training solution.
- Locate information quickly
- Less storage space

Disadvantages:

- Hardware specification must support IETMs.
- No guarantee of learning transfer.
- Preference is to read from paper based products.
- No set standards, or format.

Examples:

- eBooks

Mobile Learning (m-Learning)

Electronic learning that can be accessed at anytime and anywhere. Content is loaded on portable devices.

Advantages:

- Provide learning for people who do not have access to PCs.
- Can be accessed at anytime and anywhere.
- Can be tracked by a learning content management system.
- Easy to build mobile content.
- Most people are familiar with mobile devices. Computer literacy not required.
- 'Devices that are always on.'

Disadvantages:

- Very limited amount of space (real estate) available for each screen view
- Developers have to learn new instructional design skills.
- Content needs to be built for specific devices. Eg for apple iTouch (although some mobile software is device "agnostic").
- Security and accreditation needs to be gained from the Mod for mobile content and use.

Examples

- Nintendo DS
- i-Pods
- PSPs
- Mobile Phones

Overhead Projector (OHP)

OHP projects content on transparent slides to a main screen.

Advantages:

- Reliable.
- Normal room lighting.
- Cheap.

Disadvantages:

- Can be boring if used too much.
- Dated and not as versatile as CAI.
- Requires some training to be used effectively.
- Has to be carefully positioned to ensure all students can see screen.

Paper

Traditional paper based media with training and/or job related content.

Advantages:

- Relatively cheap and easy to produce
- Reliable with no technology requirements
- Portable and easily accessible
- Can be weather/water proofed (more difficult for electronic technologies)

Disadvantages:

- Costs compared to a technology based solution can increase significantly for a large number of copies
- Requires careful version control and management
- Difficult and time consuming to amend and distribute
- Can easily become out of date
- No moving images or interactions
- Less secure than e-documents with password protection

Examples:

- Books
- Handouts
- Aide memoires
- Checklists
- JSPs
- Manuals

Physical Model

A scale model representing the actual equipment.

Advantages:

- Can provide high level of fidelity.
- Can model movement of internal components impossible to view with GFE.
- Simplicity.
- Adaptability.
- Emphasizing colour and texture can be added.

Disadvantages:

- Can be expensive.
- Only suitable for simultaneous instruction to small groups.
- Cumbersome.
- Must be true to life.

Examples:

- Model engine cut in half.
- Plastic/rubber personal weapon.

Podcasts

Digital media files that are regularly released online and can be downloaded to PCs and portable devices.

Advantages:

- Quick and easy to produce
- Ideal for students with low literacy ability
- Suitable for language training
- Can be easily saved to mobile phones and portable music players

With the introduction of the more recent term Vodcast, most types of podcast are just audio flies.

Disadvantages:

- Requires recording equipment (hardware and software)
- Podcasts need to be hosted on a website
- Not suitable for training where visual content is important
- Content within the podcast cannot be searched (meta data needs to be created)

Examples:

- News podcasts
- Vodcasts

Polling

In a classroom context this is students voting on questions using remote Bluetooth or wireless devices.

Advantages:

- Students can contribute to the output shown on the main screen
- Interactive and engaging
- Gives feedback to instructor
- Useful tool for evaluation
- Data can be recorded for future use
- Novelty factor

Disadvantages:

- Initial cost and maintenance.
- Only supports closed questions
- Can lead to irrelevant content
- Accreditation for Bluetooth or wireless required

Examples:

- Who wants to be a millionaire

Part Task Trainers (PTTs)

A device, which enables trainees to learn and practice a particular skill or set of skills which, are part of a task for which they are being trained. (Often GFE or part GFE with partial simulation).

Advantages:

- High level of fidelity.
- Permits multiple fault injections whilst not contravening Health & Safety regulations.
- Provides realism for specific tasks.

Disadvantages:

- Cost.
- Size.
- Mobility, Accessibility.
- May support training in small groups only.
- Expensive and difficult to modify.
- At risk of subsequent updates to GFE.
- Requires extensive analysis to identify key tasks.

Examples:

- Instrument trainer

Reconfigurable Skills Trainer

An adaptable trainer that can be re-designed for different training requirements.

Advantages:

- Negates the requirement for expensive multi console training equipment.
- Allows team, sub-team and individual training. Hardware can support other training media.

Disadvantages:

- Cost of hardware, software and development.
- Some loss of fidelity may be required to allow reconfiguration.
- Long development time.

Examples:

- Microsoft Flight Simulator.
- Virtual Battle Space.
- Reconfigurable Maritime Warfare Training System (BAE System below).

Serious Games

Using computer games 3D environments for Learning.

Advantages:

- Engaging learning for gaming enthusiasts.
- Includes advantages of simulation
- Generally much cheaper than simulation
- Can be updated by SMEs

Disadvantages:

- Not all learners enjoy 3D games.
- Can require large files and increased bandwidth
- Generally only suitable for training which requires simulation

Examples:

- Virtual Battle Space 2
- Virtual DCTS (on the DLP)

Definition and Semantics? In the MoD, there is a lot of divided opinion on the use of the term 'Serious Games'. A widely accepted definition is:

> **'***The use of computer gaming technology for purposes other than pure entertainment.'*

Arguments on the use of the term include; should we be using the term 'games' within the MoD? As soon as you use the term 'serious', by association, the learning ceases to be fun. As games are usually fun to play, should we be having fun as we learn?

Another term that is gaining acceptance in certain areas of the MoD is Immersive Learning Simulations (ILS). In Caspian Learning's white paper[13] commissioned by the Defence Academy, Nov 2008, they highlight the term originates from a report from the US LT Guild, March 2008. The US report suggests the term ILS can be used as a "Trojan Horse" to circumvent some of the cultural and semantic barriers faced when using the term 'serious game' and can be viewed as more 'corporate friendly'.

Benefits

[13] http://www.caspianlearning.com/learn.html

The benefits of the use of gaming technology within education and training are starting to be realised both within tradition education, corporate sectors and the military. Hard empirical evidence of proven benefits is currently fairly hard to find. However, this is steadily improving as early adopters of the technology introduce new training interventions and perform variable degrees of evaluation on the effect of their new training/ education solution. Example case studies from early adopters can be found on The Joint Information Systems Committee (JISC)[14] and Towards Maturity[15] websites. JISC has also written a variety of useful papers including learning in immersive worlds, a review of game-based learning.

Generally accepted benefits include[16]:

- **Motivation.** Provided through good levels of challenge, rewarding player's performance, high levels of user engagement.
- **Learner Centred.** High level of learner focus and control, active rather than passive experience.
- **Personalisation.** Character representing 'you the player', high degree of presence, activities are happening to you[17].
- **Incremental learning.** Ability to stretch a learner but not too far, on the edge of success and failure, 'Bite size chunks of learning'.

Personalised Characters in Playgen's Virtual DCTS (on DLP)

- **Contextualisation.** Real-world problems, realistic environments and physical context, high graphical and psychological fidelity.
- **Rich media mix.** Aids contextualisation and media interactions available.
- **Opportunity for safe failure.** Ability to 'get things wrong' in a safe environment that would have catastrophic consequences in real life. Learn what not to do and why!
- **Immediate feedback.** Performance feedback on how well the player is doing, support mentoring functions, consequences of their actions. Competition with self and others which links back to motivation.
- **Practice and reinforcement.** Increases knowledge retention. Opportunity to revisit a failed task or level, opportunity to use different methods to reinforce learning within the same game.

[14] JISC inspires UK colleges and universities in the innovative use of digital technologies
[15] Towards Maturity Website still includes research by Becta which was the government agency leading the national drive to ensure the effective and innovative use of technology throughout learning (Becta itself was disestablished in 2011)
[16] Adopted from Caspian Learning's Serious Games in Defence Education, http://www.caspianlearning.com/learn.html
[17] Eg Virtual DCTS built by Playgen: http://playgen.com/serious-games-for-military/

- **Opportunity for collaboration and teamwork.** Collaborative multi-player technologies which can be used to practice team functions. Individuals collaborating to achieve common goals, communities of practice.

Obstacles

Within the MoD we have a number of cultural, hierarchical or structural, issues and mindsets that need to be overcome to fully adopt the use of gaming technology within military training and education. The following points are a mix of those extracted from Caspian's white paper 'Serious Games in Defence Education' which identified a number of barriers through interviews with learners, trainers and training managers which are specific to the MoD. The bullet points also include generic obstacles to the introduction of gaming technology for training which can be found within any large organisation.

- **Command & Control.** The use of gaming technology, particularly virtual worlds can be viewed as decentralising control away from the instructor hierarchy.
- **Fear of failure.** "Failure is not an option!" Whether amongst peers or viewed by our seniors / instructors, within the military we do not like to be seen to fail. Using 'safe failure' as a learning technique is hard to accept.
- **Instructor led culture.** The majority of military training is conducted by instructors. New training technology can be perceived as a threat to current practices and jobs.
- **Risk Averse.** Conservative, risk averse nature of large parts of the MoD. Oddly, this strongly contrasts with the use of many leading edge technologies in operations.
- **IT Infrastructure / Security.** MoD IT infrastructure is highly variable and often under specified to be able to run emerging training technologies. Security implications, internet access and lockdown of basic media functions limit the training solutions that can be deployed.
- **Poor design and poor previous LT solutions.** Training that has been poorly designed and executed and poor experiences with old style 'page turning' LT will affect a person's perception on the use and effectiveness of TBT solutions.
- **Generation Gap / Learner Demographics.** High level decision makers can be 1 or 2 generations away from their target audience and may require considerable convincing on the utility and effectiveness of new TBT solutions.

- **SME and instructor gap.** Can be a considerable gap in SME and instructor knowledge of how to use new technologies and apply the technologies to delivering training.

- **Time & Cost.** Concern over the Return of Investment calculations.

Types of Serious Games[18]

- **Egocentric performance**:

  Through the eyes of the character, 3rd person viewpoint controlling an avatar. Good for real time scenarios and interaction with high levels of presence. Restrictions include non player semi AI must be scripted. Lack of real time interaction means that it can be difficult to deliver planning skills to a player.

- **Construction & Management**:

  About processes, a player builds, expands and manages with limited resources. Focus is solely on building and managing, can be turn based or real time. Good for strategy level simulations, restrictions are low presence, long development time and complex.

- **Real Time Strategy**:

  Player has a top down view. Given a range of resources to control, deploy and manage. Action occurs in real time. Command & Conqueror example. Good for Strategic level decisions, big picture. Time based can add realism and pressure. Low level of presence, can be complex to design, develop and play.

- **Episodic Sims:**

  Resource management and decision making, Player can interpret data, plan over long time, make decisions then 'pull the handle' to submit responses, run the sim and see the consequences. Good for integration of reflection and deliberation into learning process – higher cognitive level, strategy level skills. Restrictions: controls and interface can be complex, time consuming to play hours to months. Could be used for business planning, project management.

- **Device Based Sims:**

  The game involves learning how to use equipment, normally vehicles, which including emulations of the actual instruments and some controls such as joysticks.

- **Branching Story:**

  Sequence of animated scenes within a story. User can influence / decide at various nodes (decision pts). Very low learning curve as relatively simple. High linearity. More complex

[18] Developed by Caspian Learning.

branching required lots of nodes and therefore lots development. Low presence and control. Suitable for new entrants / low level learners. Works well in a blended tutor led classroom. Induction training, role playing.

- **Virtual Worlds:**

  MMOG is a Massive Multiplayer Online Game. Interact with semi AI, environment and other live players through VOIP and IM chat. Some online 3D virtual worlds have strong game elements to them, objectives, and narratives. Learning benefits? Social, informal, how to measure?

Simulator

A device which presents trainees with a representation of the important features of the real situation and reproduces, as far as possible, operational conditions which enable them to practice directly, safely and economically, tasks which cannot be practiced on the job itself.

Advantages:

- Allows students to experience and gain idea of actual situation.
- Environment and teaching situation controlled.
- May be the only possible training medium due to danger of real environment.
- May be networked for federated and confederated training systems.
- Ability to replicate most fidelity requirements.
- Good for attitudinal training.
- Can provide the opportunity to improve unit collective performance wherever people need to practice expensive or dangerous activities under realistic conditions.
- Actively involve the learners in making decisions, playing roles and adopting attitudes.
- Simulators allow instructors to progress from simple to complex scenarios.
- The operation of certain equipment or scenarios may lead to environmental damage and could therefore be constrained in time and realism. In such cases the only way in which practice may be allowed is by simulators.

Disadvantages:

- Can be expensive.
- Requires instructor to brief, monitor, and debrief for learning transfer to occur.
- Assessments tend to be subject, relying on the experience of the instructor.
- Must be well designed to ensure maximum benefits both intellectually and emotionally.
- Requires careful project management to ensure that only required learning outcomes are provided.
- Requirements likely to be over specified.
- New software must be developed each time a change is made to operational equipment.

Examples:

- Flight Simulator

Smartboard

PC driven interactive white board combining audio-visual support with an instructor. It allows the user to drive software via a touch screen.

Advantages:

- Professional look
- Good for motor skills when used with photo realistic software
- Puts instructor in front of the class.
- Can record actions and display for later use or demonstrations.

Disadvantages:

- Expensive
- Instructor may mask some of the presentation when using the touch screen.
- Rear projection units are slicker, but more expensive.
- Can dominate classroom.
- Front projection units are masked by the instructor

Examples

- Multi-Touch SmartBoards (only in Windows 7 or above)
- Virtual Mission Board (see below - Boeing)

Social Networking (Online)

Learners interact with tutors and other learners via the web. It can be both synchronous (instant interactions in real time) or asynchronous (see glossary).

Advantages:

- Learners can continue to receive support from tutors and other learners outside the classroom.
- Learning is captured and can be viewed and shared by tutors and other learners.
- More efficient management of learning resources which can be centralized and easily accessed.

Disadvantages:

- Online tutors will require new skills as opposed to classroom delivery.
- Learners and tutors require access to the web.
- Cultural change required for both tutors and learners.
- Efficient and accredited IT infrastructure required.

Examples:

- Virtual Learning Environment (VLEs)
- Webinar
- Chat Room
- Forum
- FaceBook, Twitter etc[19]

[19] MOD Online Engagement Guidelines for Social Networks are at: http://www.mod.uk/DefenceInternet/AboutDefence/CorporatePublications/MediaandPublicCommunicationPublications/OnlineEngagementGuidelines.htm

Stimulated Government Furnished Equipment (GFE)

Controlled inputs directly to a piece of equipment that has been embedded in the training system, thus allowing it to be used as a simulator. Stimulation is most effective when a large or complex function needed for training can be totally provided by an embedded special purpose computer and its internal software.

Advantages:

- High fidelity
- Key inputs generated without the need of live inputs.
- Cues can be programmed in increasing complexity.
- Cheaper than simulation over long term.
- Ability to freeze and reset features.

Disadvantages:

- High upfront costs.
- May require changes as operational equipment develops.

Examples

- War Gaming Applications

Teleconference

Conference over the telephone involving more than 2 people.

Advantages:

- Synchronous audio comms
- Only requires a telephone line - no PCs or Internet required
- Well established with capabilities at most units
- Optional recording available

Disadvantages:

- Some extra equipment may be required.
- Telephone provider will charge extra for conferencing services.
- No visual implies unable to read body language.
- Needs to be carefully facilitated to ensure all contribute and people are not talking simultaneously
- Unlike chat room records, content in recorded teleconferences must be searched by a human rather than a fast search engine

Video

Video media refers to several storage formats for moving pictures. Can be analogue or digital**.**

Advantages:

- High visual fidelity.
- Provides movement, colour, brings events/demonstration into classroom that would be difficult and expensive to repeat.
- Can be used for attitudinal training (Alcohol & drug education, Equal Opportunities, Safety).
- Time saving substitute for field trips.

Disadvantages:

- Can be costly to produce and up-date.
- Can become quickly dated and loose of credibility (c.f. Open University).
- Passive, requires instructor present to be effective, followed up by questioning to check understanding.
- Trainee passiveness.
- Equipment requirement.
- Requires supplemental methods.
- Can become dated.
- Copyright laws.

Examples:

- VHS
- DVD
- Blu-ray

Virtual Reality

Simulation of dynamic information and the immediate work environment, possibly including sight, sound, smell and touch simultaneously. VR technology typically involves using powerfu computers. Commonly seen in helmet mounted displays.

Advantages:

- Allows visualization and training on equipment's and platforms that do not yet exist.
- Material may already be in existence from CAD drawings.
- Can use cues to enhance trainee performance.

Disadvantages:

- Cost of hardware, software and development.
- 'VR sickness', visual lag in eye and/or head track systems.
- Technology now maturing requires very careful targeting. Long development time.
- Typical update rate of 20-30 frames per second required, trade off is lack of detail.
- No standards for hardware and software when applying VR technology to training.

Example

- VR parachute Trainer.

Virtual World

A Virtual World is an interactive simulated environment accessed by multiple users through an online interface.

Advantages:

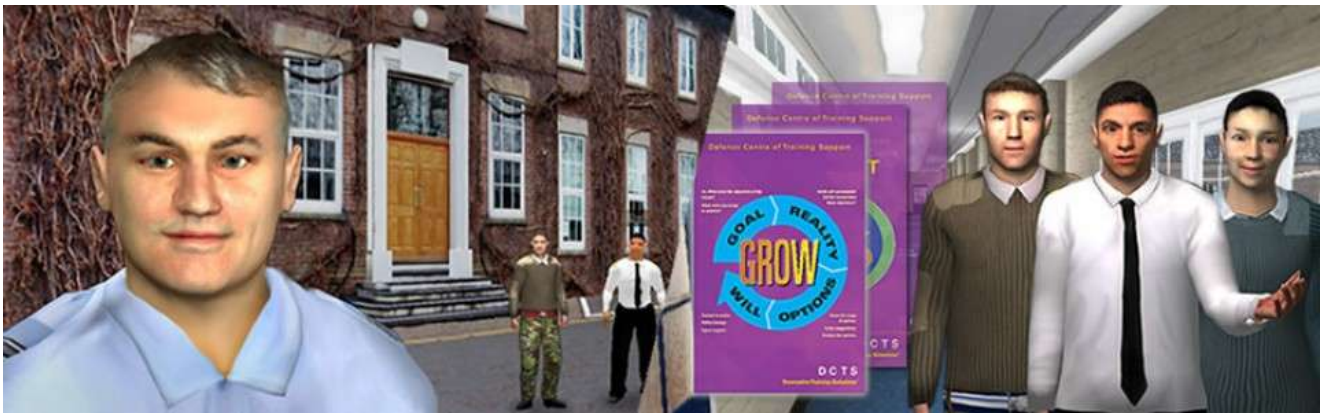
- Allows participants to collaborate remotely in an environment representing the real situation
- Personal representation through life like models (avatars)
- Real time audio or text chat available
- Ideal for team training
- Events can be recorded for "After Action Review" from any participants perspective

Disadvantages:

- Costly to develop initially
- Bandwidth intensive if high fidelity required

Example

- Second Life
- VBS2
- Virtual DCTS[20]



[20] More information about the project at http://playgen.com/portfolio/open-source-virtual-world/

Vodcast

Online video accessed over the internet.

Advantages:

- Easy to produce: e.g. most new mobile phones are capable of producing video suitable for Vodcasts
- Easy to distribute via the web and update.
- Easily accessed.
- Can be downloadable to a portable device.
- Can be streaming with controls to skip sections

Disadvantages:

- Normally low quality video means full screen not advisable
- Increases bandwidth
- Passive with no interaction for student
- Internet required

Example

- YouTube

Video Teleconference (VTC)

Real-time conferencing normally over a broadband network involving high quality video and sound.

Advantages:

- High Quality (HQ) compared to Web Cams
- HQ enables large screen projection viewable in a conference hall
- Includes flexible software for sharing electronic resources such as documents.
- Enables collaboration of a large number of people distributed over a wide area

Disadvantages:

- Significant bandwidth and comms infrastructure requirements
- Expensive and difficult to set up and maintain
- Training required for operation of VTC
- May not always be available due to technical issues
- Security issues of using VTC in areas with classified information being disclosed (both through visual and audio media)

Wall Charts

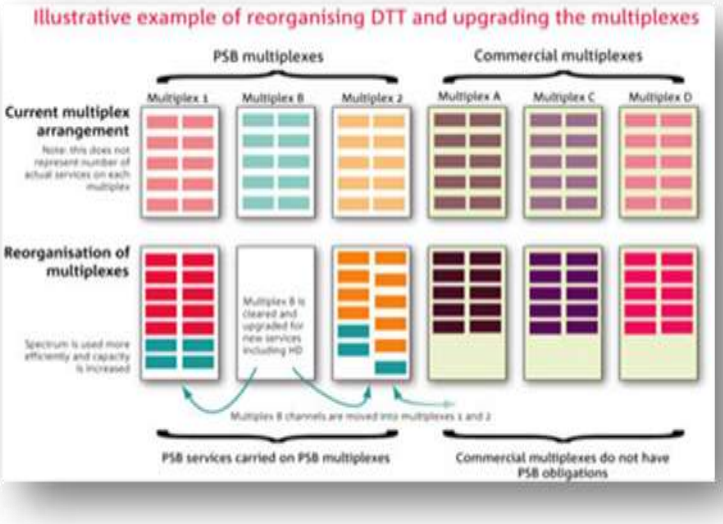
Posters on classroom walls showing training content.

Advantages:

- Useful for showing complex details such as charts, maps and complete electrical/mechanical systems.

Disadvantages:

- Preparation is time consuming and expensive if produced commercially.
- Not easy to amend.



Web Based Training

CBT delivered over the Internet or an Intranet, often via a Learning Management System. The usual meaning of the term ‘e-Learning’ when used by industry. Synonymous with On-Line Learning.″

Advantages:

- Lots of COTS packages.
- Ability to access anywhere, anytime.
- Can be hosted on LAN, local intranet or the Internet. Flexible.
- Good for stable course content.

Disadvantages:

- Can be costly to provide a good bespoke product.
- Many COTS packages are educational.
- Need to consider security risks (especially if using INTERNET).

Examples:

- DLP Courses

Web Cam

Small video camera designed to transmit video images over the web in real time.

Advantages:

- Cheap to purchase compared to standard video cameras
- Small, Light and portable
- Includes standard software for working with applications such as MSN Messenger
- Highly compressed video output requires low bandwidth
- Very easy to learn and operate
- Includes both audio and visual

Disadvantages:

- Low quality compared to standard video
- Security issues of using webcams in areas with classified information being disclosed (both through visual and audio media)

Examples:

- Free Standing
- Integrated (above Laptop screen)

Webinar

Short for Web-based seminar, a webinar is a presentation, lecture, workshop or seminar that is transmitted over the Web.

Advantages:

- Transmitted over the Web to provide highly interactive synchronous learning.
- Sessions can be recorded and the learners can replay back the session in their own time (Asynchronous)
- Instructor and students can be seen via webcams, communicate via the use of a phone or VOIP and utilise a text chat function.
- Easily upload PowerPoint slides to deliver a lesson, presentation or lecture.
- Learners can be directed to break out areas to work in smaller groups.
- Up to 1000 personnel can login and listen in to a webinar session at any given time.
- No T&S outlay as the students are either at their place of work or home.

Disadvantages:

- Companies charge a monthly subscription fee which is dependent on the amount of sessions a training organization wishes to run per month.
- There are additional charges for using VOIP or telephone calls which is either levied against the training provider or students.
- Technical issues cannot be easily rectified as the students can be anywhere in the world.
- You need to have at least 2 people running a session. One person presenting whilst the other is monitoring the text chat area and answering any questions raised as well as dealing with any technical issues.
- Hard to gauge if students are actually listening.

Examples:

- GoToWebinar
- Webex
- Adobe Acrobat Connect Pro

Whiteboard

Display board used with marker pens - can be magnetic.

Advantages:

- Can be seen by whole class.
- Visual confirmation of student's input
- Easy and fast to update
- Flexible content

Disadvantages:

- Requires careful use and planning. Can become a scribbling pad.
- Neat handwriting required.
- Cannot be saved for future review.

Glossary of Terms

Term	Definition
ADLNet	Acronym for Advanced Distributed Learning Network, the creators of SCORM.
AICC	*Aviation Industry CBT Committee*, the body that defines a range of standards for the aviation industry. The AICC standard for Interoperability of computer-based training programmes and Learning Management Systems is probably the best known standard.
API	*Application Program Interface*, a set of tools, routines and rules for building software applications in a consistent way. It also includes a specification intended to be used as an interface by software components to communicate with each other
ASCII	*American Standard Code for Information Interchange*. The standard text format used by the majority of PC's, often used to describe files containing plain text.
ASP	Acronym for *Active Server Pages*, a language developed by Microsoft to allow improved interactivity within webpages.
AVI	Acronym for *Audio Video Interleave* - the file format used by Microsoft Video for Windows.
ActiveX	Set of Microsoft programming technologies and tools that includes ActiveX controls, which can be programmed to run within an application such as a web browser just like a Java applet .
Applet	A short Java program that downloads and then runs on your computer when the user accesses a webpage. These provide applications normally unavailable within webpages.
Asynchronous Learning	A student-centred teaching method that uses online learning resources to facilitate information sharing outside the constraints of time and place among a network of people.
Audio Visual Aids	AVAs are aids to communication, learning, teaching, remembering and research, which utilise both sight and hearing.
Augmented Reality	A combination of a person's real world view and a computer generated virtual scene that augments the world with additional information. See Augmented Reality
Authentication	Process of confirming the identity of an individual.
Authoring Tool	Software for creating course interactive material. Authoring tools help the

	user create online modules that integrate all components of a course: text presentations, graphics, links, questions, and tracking of student performance.
Avatar	Computer generated representations of humans. Normally 3D and are controlled by humans. Avatars generally interact with other avatars and resources in virtual worlds. Computers can also generate semi artificial intelligent avatars that can interact with human controlled avatars.
Bandwidth	Term that describes how much data can be sent via a connection in a specified time. This measurement is typically described in bps or bits per second.
Binary	A file that contains something other than plain text or ASCII files. These could include pictures, software and other media.
Bit	The minimum unit of computer data - either a 0 or a 1.
Blended Learning	A blended learning solution combines educational and training methods, media and environments to increase learning effectiveness and efficiency to meet specific training needs. These solutions can then be considered and prioritised within practical constraints such as cost, time, political and legal.
Blog	A blog (short for weblog) is a personal online journal that is frequently updated and intended for general public consumption or other learners when used in a VLE.
Bps	Acronym for *Bits per second* the units in which the speed of connections are rated. Indicates the amount of information that can be transmitted and received each second.
Browse	Process of viewing webpages over the World Wide Web.
Browser	Program that allows you to view and interact with webpages on the World Wide Web. Examples are Microsoft Internet Explorer, Google Chrome and Mozilla Firefox.
Byte	Unit for measuring data - 8 bits.
CD	Acronym for *Compact Disc*, a media format developed by Philips. Originally an audio-only format the CD has spawned a range of derivatives including CD-ROM (Compact Disc Read Only Memory), CDi (Compact Disc Interactive) CD-R (CD-ROM Recordable) and CD-RW (Compact Disc Read Write).
Chat	Talking to one person or many people, usually in text format via the internet.
Client	Program that links up with another resource (a server programme) or the computer that runs it for the purposes of interaction. A browser programme is one example of a client.

CMS	Course Management System. Centralised software application that facilitates and streamlines the process of designing, testing and posting LT content, usually on web pages. E.g. Moodle
Compress	Reducing the size of a file so that it can be transmitted more quickly and takes up less storage space.
Cookie	Small element of data sent to your computer when you a website. When you subsequently return to the site this data may be used for a range of things including recalling your username.
DHTML	Acronym for *Dynamic HTML*, a new way of developing webpages with enhanced functionality. Standards for DHTML are still being developed.
DLL	Acronym for *Dynamic Link Library*, the range of routines that can be used by a Windows application.
DNS	Acronym for Domain Name System the system that regulates naming of computers on the internet. The core of the system is a vast database that stores the names and network addresses of every computer, accessed whenever a computer needs to convert a Domain Name into a numeric IP address.
Digital	Made up of zeros and ones (or bits of information)
Distributed Learning	Learning that is conducted away from the organisation responsible for the development, maintenance and management of the training and education. It may be based on individual materials, instructor-led packages or a course conducted at a number of locations.
Download	The process of copying files from one remote host to your computer, usually via FTP.
LT	Learning technologies (LT) is the broad scope of technologies (including hardware, software and communication networks) that can be used to support, manage and deliver learning.
ERP	Acronym for *Enterprise Resource Planning,* a business management system that integrates all functions of an enterprise, normally though deployment of software systems.
Email	Sending electronic messages over a network or the internet.
Extranet	A local area network (LAN) or wide area network (WAN) using TCP/IP, HTML, SMTP, only available to people inside and certain people outside an Organisation, as determined by the Organisation.
FTP	*File Transfer Protocol*. Process that allows you to transfer files or programmes to or from computers across the internet.

Flash	A vector graphic animation tool marketed by Adobe and widely used for developing web delivered LT.
GIF	Acronym for *Graphics Interchange Format*, a common format for the storage of largely non-photographic imagery.
GUI	Acronym for *Graphical User Interface*, an application that allows users to interact using graphics instead of text. e.g. Microsoft Windows versus MSDOS.
Gigabyte	1024 megabytes of computer data.
HTML	Acronym for *Hypertext Mark-up Language* -the basic language that is used to construct webpages. There are several HTML standards in existence, the latest of which is HTML 5.
HTTP	Acronym for *Hypertext Transfer Protocol*, the standard that regulates the way information is transferred around the World Wide Web.
Hardware	Physical technology such as: computers, monitors and keyboards rather than software.
Hits	The number of requests for information made to a server.
Host	Computer that exists to allow other computers to connect with it.
Hyperlink	Underlined word or set of words that, when clicked, takes you to a different place on that page or to a new destination altogether.
IEEE	Acronym for *Institute of Electrical and Electronic Engineers*, a body with a Learning Technology Standards Committee that is responsible for the defining standards for Learning Management in the USA.
IMS	The IMS Global Consortium works with institutions and LT software vendors to define specifications.
IP	Acronym for *Internet Protocol*, the rules that regulate the way information is transferred across the Internet.
ISDN	Acronym for *Integrated Services Digital Network*. This telecommunications technology provides increased bandwidth using telephone lines but generates significant additional cost.
ISP	Acronym for *Internet Service Provider*, companies that provide users with access to the internet.
Internet	The full range of networks interconnected via TCP/IP protocol.
Internic	Acronym for *Internet Network Information Centre*, the nearest thing to a central body governing the Internet.

Intranet	A private network inside an organisation that uses Internet technology, but is segregated from the Internet by a firewall. This means that authorised users can only access this network.
JPEG	Acronym for *Joint Photographic Experts Group*, the committee that originally developed this special image file format. JPEG files are now the most popular format for storing photographic images on the World Wide Web.
Java	Language developed specifically for creating software that can be simply downloaded from the Internet, but now used for a wide range of applications.
JavaScript	Language similar to Java but actually incorporated into webpages in the interests of creating various special effects.
Kilobyte	Unit of computer data, made up of 1024 bytes.
LCMS	A learning content management system (LCMS) is a related technology to the learning management system LMS in that it is focused on the development, management and publishing of the content that will typically be delivered via an LMS. An LCMS is a multi-user environment where developers may create, store, reuse, manage, and deliver digital learning content from a central object repository. The LMS cannot create and manipulate courses; it cannot reuse the content of one course to build another. The LCMS, however, can create, manage and deliver not only training modules but also manage and edit all the individual pieces that make up a catalogue of training. LCMS applications allow users to create, import, manage, search for and reuse small units or 'chunks' of digital learning content/assets, commonly referred to as learning objects. These assets may include media files developed in other authoring tools, assessment items, simulations, text, graphics or any other object that makes up the content within the course being created. An LCMS manages the process of creating, editing, storing and delivering e-learning content.
Learning Portal	Web site that offers learners consolidated access to learning and training resources from multiple sources.
LMS	A Learning Management System is a software application which companies use to manage their learning. A "heavy" LMS will include functionality for managing ALL elements of training and education such as classroom and instructor allocations as well as hosting eLearning. A "light" LMS may only host eLearning and user accounts. See also CMS
Login	The acts involved in entering a computer system or the account name you have been allocated to gain access.

LRI	Acronym for *Learning Resource Interchange*, a Microsoft application developed to a specification developed by the IMS
Learning Technologies	Learning technologies(LT) is the broad scope of technologies (including hardware, software and communication networks) that can be used to support, manage and deliver learning.
MIME	Acronym for *Multipurpose Internet Mail Extensions*. The standard for attaching binary files to email.
Moodle	Moodle is an Open Source Course Management System (CMS), also known as a Virtual Learning Environment (VLE) and sometimes a basic Learning Management System (LMS). Tutors can create their own courses and add resources such as docs, graphics, videos, forums, wikis, quizzes and SCORM files. Moodle stands for: Modular Object Orientated Dynamic Learning Environment.
MPEG	Acronym for *Moving Picture Experts Group*, the committee who devised this file format for storing video images.
Megabyte	Unit of computer data made up of 1024 kilobytes.
Mirror	Exact copy of a resource such as a website.
Network	Two or more computers connected together.
ODBC	Acronym for *Open Database Connectivity*, a standard that allows interconnection between one application and another.
Offline	Term that implies that an item of hardware or software is no longer actively linked with the Internet. See Online.
Online	Opposite of Offline i.e. an item of hardware or software is actively linked with the Internet.
Operating System	The basic system that underpins computer operations and the foundation upon which all other programs operate. MSDOS, Unix and Windows are all examples of operating systems.
Packet	A unit of data sent via a network.
Podcast	Digital media files that are made available online and can be downloaded to PCs and portable devices.
Post Office Protocol	POP. Location where connections to a network or the Internet may be accessed via dial-up networking.
Protocol	A set of rules and standards that govern the way networked computers

	interact with each other.
Router	Mechanism for transferring data between one or more networks.
SCORM	Acronym for the Shareable Courseware Object Reference Model standard developed by ADLNet
Server	Both the software and hardware that is used to provide access to an internet resource.
SMTP	Acronym for *Simple Mail Transport Protocol*. The almost ubiquitous standard that governs how email is sent and received.
Social Networking	Learners interact with tutors and other learners via the web. It can be both synchronous (instant interactions in real time) or asynchronous.
Software	The files, data and programs that allow a computer to function but have no physical dimensions. By way of contrast see Hardware.
TCP	Acronym for *Transmission Control Protocol*, the rules that govern information systems distributed over a network.
TBT	Technology Based Training. Any use of CBT, CAI, Computer Simulation/Emulation or interactive video. This term is now generally being replaced by Learning Technologies in line with industry and academia.
Terabyte	Unit for a large amount of computer data, consisting of 1024 gigabytes.
Unix	Operating system for mainframe computers originally designed in the 1960's but still widely used worldwide.
Upload	Send files to another computer, usually via FTP.
URL	Acronym for *Universal Resource Locator* otherwise known as the address of a website.
Virus	Self-replicating software that propagates itself from one computer system to another, normally devised with malicious or mischievous motives.
VLE	Virtual Learning Environment: A dynamic web based application which enables learners to access online courses and resources created by their tutors. Most VLEs include Social Networking functions such as Chat Room, Forum, Wiki, Blog and messaging. An example used by the MOD is Moodle (Modular Object Orientated Dynamic Learning Environment).
VoIP	Acronym for *Voice over Internet Protocol*, or using the internet to transmit voice conversations, a technique increasingly used within virtual classroom systems.

Web Based Training	CBT delivered over the Internet or an Intranet, often via a Learning Management System. The usual meaning of the term ‘e-Learning’ when used by industry. Synonymous with "On-Line Learning." See Web Based Training
Web space	Amount of data capacity available for the construction of webpages, normally measured in megabytes.
Webinar	Short for Web-based seminar, a webinar is a presentation, lecture, workshop or seminar that is transmitted over the Web. See Webinar for more info.
Website	Collection of linked webpages with a common theme, created for the same purpose.
www	Acronym for World Wide Web.
World Wide Web	A global information resource made up of interconnected webpages.