

'Involve your learners'

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Abstract

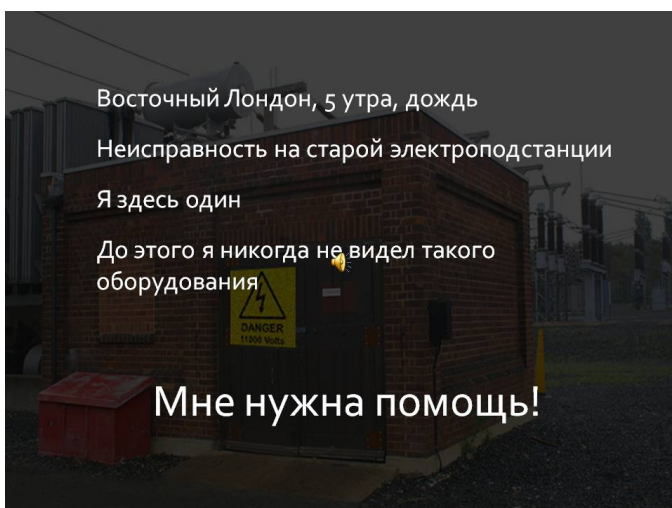
What makes a really effective eLearning course? How can you deliver great content to seize, entertain and train your learners as well as measuring their true understanding and competence? Tim Neill draws on 22 years' experience as an eLearning development professional to explain and demonstrate the key ingredients of world class courses and assessments. The examples shown were packed with novel and engaging techniques such as virtual 3D Academies, realistic workplace challenges, task simulations and animated processes.

The thrust of this presentation is that employees need and deserve far more than a transfer of knowledge through traditional training (classroom or on-line self-study), in order to effectively carry out their jobs. Expert staff *already* know how to deal with an angry customer or quickly diagnose and repair a faulty piece of equipment. They've been doing it for years.

What organisations are faced with is the challenge of repeatedly equipping new (often young) staff with the understanding, confidence and resources *to perform as their expert colleagues do*.

The presentation included working examples of interactive training, practice, competence assessment and 'just in time' resources, delivered in a way which, by engaging and *involving* the user ensures that their interest and confidence is maximised. People will forget the great majority of the information they passively see and hear during a training session. But if they are challenged to explore and investigate in an intriguing environment, to experiment without physical danger, damage or expense, they become *involved* in the learning, and the working procedures and materials become embedded far more deeply than by using conventional instructional methods.

The scene is set ...



A gloomy east London electricity substation, the time is 5am and it's raining

There's a fault at an old electricity substation

The engineer attending has never worked on this equipment before

He is alone and he needs help!

In the ideal working world described and demonstrated in the presentation, our engineer would take out his tablet or smartphone, launch an app and point the camera at the printed QR (Quick Response) code screwed to the substation door.



The app scans the QR code and opens his web browser at the web address embedded in the code.



In fact, from that web address he could be provided with everything he might need to deal safely and efficiently with the call, in spite of never having worked on this equipment before.

Better still, he probably won't need to call for assistance.

In effect, the QR code acts as a portal to his field support system.

In a similar way, each item of equipment in the substation could also be labelled with QR codes to route him to the relevant web material.

Another technology which could be used in a similar role (and one that is gaining popularity in the advertising and tourism industries) is *Enhanced Reality (ER)*, which is described briefly at the end of this paper. Using ER, the engineer's app would scan the scene in front of him and attempt to match it with a library of images stored on the device or online. If it finds a match, it *overlays* material onto the screen, such as an interactive menu, a video clip, a still image, etc.

The presentation now temporarily left our engineer to illustrate the key ingredients of great content and which I believe can dramatically improve the engagement of learners.

1. Measurable outcomes

Whatever training intervention is being planned, the first question to be asked is 'what do you want staff to be able to *do*?' by the end of it and not 'what do we want them *know*?'

It's easy to see why companies cling to the old habits of immersing learners in a sea of paper and PowerPoint slides ... subject matter experts are on hand to lecture them, there's a vast body of information you can give them, and it's easy to set a test at the end of the course and be able to say that all attendees achieved over 90% and therefore they are ... *what?* Competent? No. Confident they can tackle the tasks you've led them through? Probably not. Ticked as 'Trained' in a compliance report? Ah, yes. But we've let them down, they're not actually *trained* are they?

Involve your learners ... key steps for delivering great content! Tim Neill

1. Measurable outcomes

- What are the *objectives* of your staff training?
- Training Objectives = *Business* Objectives
- Train them to be able to *DO*, not just to *KNOW*

Bad Learning Objective

"Recall the names of 12 dangerous liquids which must not be carried on aeroplanes"

Good Learning Objective

"Find the cause of a fault within 5 minutes, using test equipment and reference materials"

Example

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All we've done is 'dip' them in information and hoped that some of it will stick and, less likely, that they'll be able to apply what they can remember when they're eventually faced with a task to complete.

So, all learning objectives should really be aligned to *business* objectives and most crucially, their achievement must be *measurable*.

I explored this subject many years ago in a paper entitled ['Designing Learning Objectives that are measurable'](#) which I still think is a valid approach.

Examples of 'lazy' learning objectives (which measure only the recall of learned information) include listing from memory the names of products and specifications, dates, pricing, company vision and value statements, details of competitors' products, etc.

Compare these tests of memory with the far more revealing insight into understanding and early competence which can be gleaned from interactive challenges, possibly in the form of games. The example shown posed fault-finding tasks on a machine, in which the learner could take measurements, make visual inspections, replace components and if necessary, ask for hints and refer to a library of reference manuals. Each action incurred a cost in labour time and possibly in parts cost. Their final competence rating is calculated against the 100% score of an expert.

2. Core training versus 'Just in Time'

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1. Measurable outcomes ✓

2. Core or 'Just in Time'?

- Don't teach *knowledge* - it's free and it's everywhere!
- Separate initial *core training* from workplace support

Why?

- People forget most of what they've learned
- You can't train everyone on *all* equipment they might work on
- Training material and equipment data is quickly outdated
- Knowledge may not be needed for months or years
- Mobile devices give on-site guidance ... '*Just in Time*'

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Another common mistake is to try to cover too much material during initial training, most of which will probably be forgotten and *all* of which could be available online at the workplace.

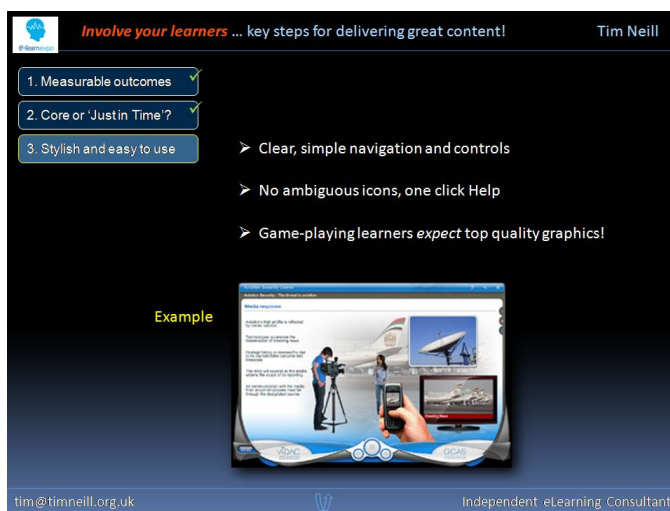
Analyse what staff need as a *foundation* for their work (the core material covering

concepts, basic procedures, etc.) and then provide everything else they'll need in the form of 'job aids' in the workplace. This will often be too harsh a division so in some situations it could make sense to run an initial 'core' training session, followed by small modules which 'drip feed' the learning in the workplace, in bite-sized chunks.

Today's businesses change constantly and it's impossible to keep all staff trained on all products or procedures. Product specifications change, staff move and since products and systems are becoming so reliable, it may be months or even years before an employee needs to use specific training. The missing element in providing 'just in time' support has been the lack of access to the material in the workplace. Now that's all changed with the widespread adoption of mobile devices such as tablets and smartphones, and the improving bandwidth of mobile data networks.

3. Stylish and easy to use

Today's employees have high expectations of any online material you give them. The interactive games they play, the applications they use daily and the world class web sites they visit have all raised the game for developers of commercial training programs.

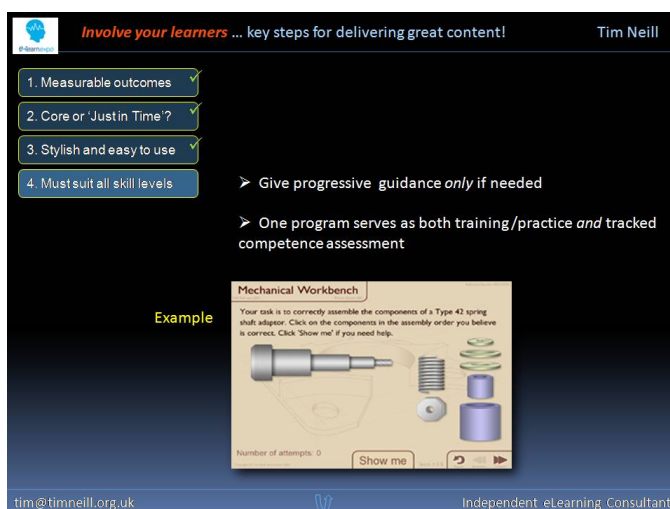


So any material that a company obliges its staff to use has to look and behave as world class deliverables.

The example shown was of an eLearning course developed for a middle eastern airport, illustrating how a beautiful graphical interface and simple, unambiguous navigation controls combine to 'win over' the user. If your users don't respect the material you give them, the impact may be irretrievably compromised.

4. Must suit all levels

Think about the range of skill levels of the staff who will use any new training course or assessment. In designing a program, ideally you only want to create a single version that will adapt to all levels of user – this keeps down the cost of creation and the cost of making changes too.



The deceptively simple example demonstrated asked the user to place seven components onto a shaft in the correct sequence. An expert would complete the task in a few seconds, making no mistakes and requesting no help.

A novice, on the other hand, having made a mistake may ask for a hint. The program then dynamically places each component on the shaft up to and including the stage the

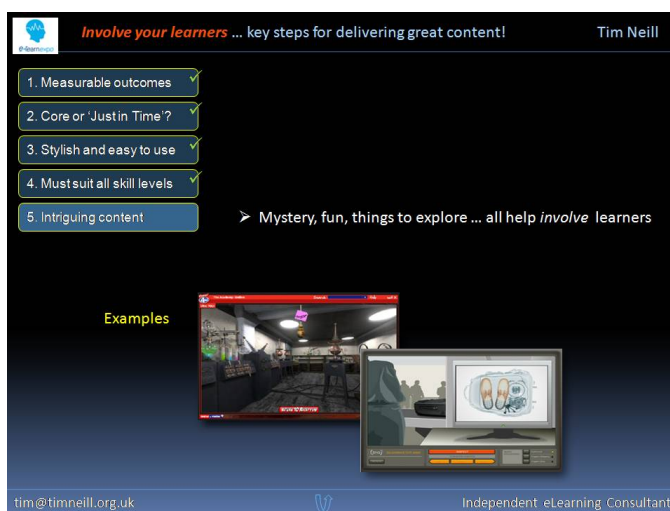
user was at – but no further. This is effectively how an expert colleague standing at his shoulder might behave, saying “I’ve corrected *that* step for you, now you carry on and complete it.”

This type of guided practice suits all levels of ability, without on the one hand patronising the expert, and on the other not risking confusing the novice. When used as an *assessment* test it is easy for such a program to score the user on the data captured for the total time taken, number of incorrect actions made and the number of requests for help.

5. Intriguing content

There is nothing wrong in creating engaging (yes, *fun!*) material for staff *if the end business objective is achieved*. The terms ‘Serious Games’ and more recently, the technique of ‘Gamification’ accept that people learn how to perform more deeply when they tackle challenges.

It’s our ‘inner child’. We’ve all got one, hidden in there somewhere, buried beneath years of suited conformity, hiding under layers of corporate speak and the serious faces our clients expect of us.



The two examples I demonstrated were at opposite extremes of complexity and budget: a 3D virtual academy produced for a mobile phone retailer and a simple, but very effective low cost training simulation on X-ray baggage scanners.

6. Challenge your learners!

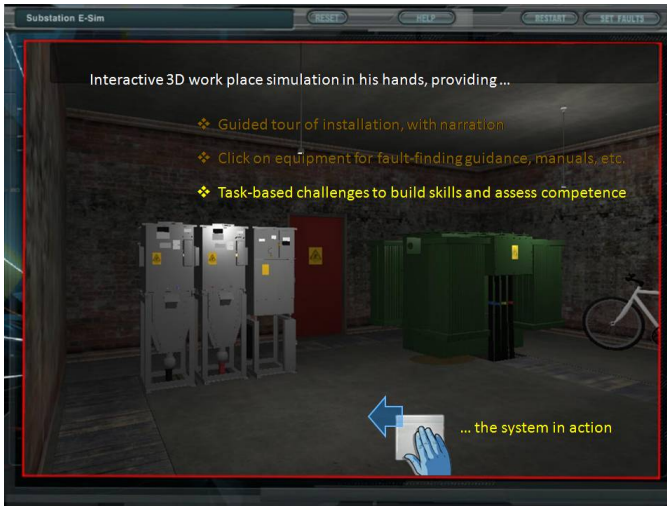
Game-playing is now well-established as a device for engaging learners in proving how competent they are in performing one or more tasks. The approach fits well with the influx of younger staff who often have many years of gaming under their belts. Many of them will *expect* to tackle games as part of their training. Don’t disappoint them ...



The example I demonstrated comprised the key elements of an effective, simple game: the subject matter was 100% relevant to their jobs, it was easy to use and required no special skills to play, penalties were incurred for dangerous/inappropriate actions, bonuses were earned for recommended actions taken sooner, the difficulty increased over time, it was against the clock and finally, their overall game score gave them a reason to repeat the session and do better. Tension rises as the speed of the conveyor belt increases and the user has less and less time in which to select the correct extinguisher.

Back to our engineer at the substation.

This is a mock-up of the tool we could give him ...



I demonstrated a 3D interactive simulation of a local electricity substation, the transformers and other switching equipment which take 11,000 volts 3 phase electricity input and step it down to 440/230 volts for commercial and domestic supply.

The simulator includes realistic 3D models of transformers, switchgear and a distribution panel with isolation links – these are used to remove power from a section of equipment to enable work to be carried out safely.

An interactive tool such as this, once built, can serve *multiple* roles.

For example, once inside the building the engineer might choose (from a menu) a narrated, guided tour of the facility, highlighting each item of equipment and summarising its key specifications.

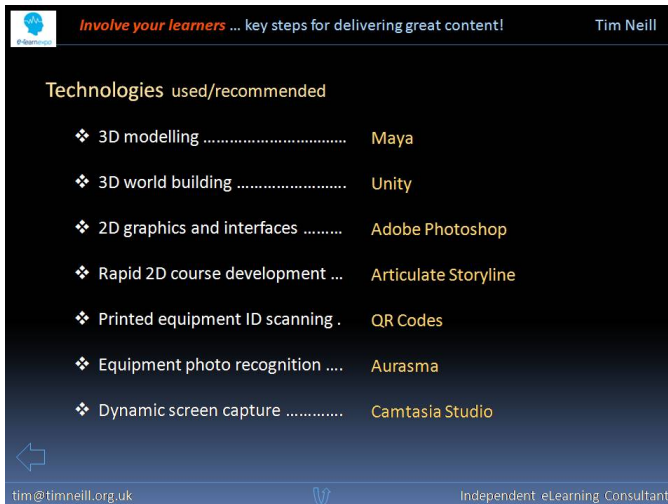
Or, he may elect to choose a specific piece of equipment and click on different highlighted areas to find out information such as what servicing procedures are specified, the test voltage values to expect, the most common faults occurring, safety warnings and precautions, etc. Armed with this information, he can now safely and confidently start work.

In my demonstration, I showed how such a simulator can also serve as an assessment tool, on the job possibly or, more likely, in a supervised setting. Engineers could also use the simulator as a safe practice tool, a 'sand pit', where actions may be taken safely and without costly damage to equipment. In that role, learning will only take place if there is clear feedback on their actions and guidance on the *correct* procedures. Without these elements, the simulator will simply be a game and will have failed its purpose.

In the interactive assessment game that was shown, the user is challenged to find several equipment faults within a limited time. He may move freely around the room, moving as closely as he wishes to inspect areas in detail. When he spots a fault, he clicks the item or area and the game gives feedback on whether or not the decision was correct. The number of possible attempts is limited (to mitigate against reckless clicking) and a Help button provides clues on where to look. Each click of the Help button reduces their score. Either the user finds all the faults within the time limit, or the time limit is reached and the session ends. In either case, a report summarises their attempt and gives them a percentage competence score.

The simulator I demonstrated may be published for use on a Mac, PC, tablet or smartphone.

Recommended tools and technologies



The working examples demonstrated in the presentation were built using a variety of commercial development tools. My comments on these are:

3D modelling (all produced by 3D guru Jean-Marc Gruninger)

Lightwave originally, and now *Maya*, are used to build high quality environments and components for importing to the 3D simulated world.

3D world building (all produced by Jean-Marc Gruninger)

The substation simulator was built with *Unity*, using imported 3D geometry. Unity is the de facto development program for interactive games for delivery on PCs, Macs and mobile platforms. Our simulated substation uses only a tiny set of Unity's incredible facilities.

Another recommended system for building interactive 3D worlds is 'Thinking Worlds' from Caspian. Whilst it lacks the high quality, realtime scene-rendering, effects and other simulation controls of Unity, it's a very easy-to-use development tool for creating immersive interactive games and simulations.

2D graphics

Adobe *Photoshop* remains the weapon of choice for creating and editing user interface graphics, buttons, menus and all other discreet 2D imagery.

Rapid 2D course development

I am a strong supporter of the new generation of eLearning development tools, in particular *Storyline* from Articulate. ('Other programs are available' ... such as Adobe Captivate). They can speed the process of creating the working program, saving time and external costs if you choose to develop in-house.

However, these tools don't remove the need for sound instructional design, proper scripting, the creation of high quality assets, the recording and editing of narration or management of the project. But compared to the in-house skills that would be required to create interactive content using Adobe *Flash*, products like *Storyline* can bring big benefits for certain types of course and assessment. They won't create really rich, dynamic content or animations though – for that you'll still need someone, somewhere, to be a wizz with *Flash* and/or a 3D modelling program.

Printed equipment I.D. scanning using QR (Quick Response) codes

Using a mobile app to quickly scan a QR code with a smartphone or tablet is a very efficient way of accessing relevant information without having to start typing web addresses into a browser. For example, each item of equipment could have its own QR code shown on a printed label on its cover panel. The QR codes will have been generated online to route a user's browser to a specified web page. In my example, the URL embedded in the QR code took the user's browser to a web page and played a narrated video tour of the substation. Other QR codes could take the user to pages with close-up images, annotated diagrams, PDF documents, etc.

Equipment photo recognition

A newer technology that is gaining widespread coverage is that of image recognition using a smartphone camera, known as *Enhanced Reality* or *ER*. The image might be a scene (St. Basil's Cathedral for example) or a transformer cabinet in a substation.

The user launches an app on their mobile device and points their device camera at the scene or object. If the app finds a match with a previously stored image (the 'target') it then replaces the image on the user's device screen with other material (known as the 'overlay'). The overlay might be a narrated video clip, an animation, a text overlay giving information about the subject, a narration or ... it might redirect the user's device to a web-based eLearning module or a 'Just in Time' guidance module. And that's without typing a single character into the mobile device!

One of the easiest to use ER creation and viewing apps is *Aurasma*, which enables you to capture target images and locally link them to specified overlays, such as video clips or animations. There is also an online development tool for creating 'auras' (pairs of target images and overlays) for sharing amongst many users. This is an exciting technology, well worth investigation for staff support on-site.

It's not perfect though – if the target image was captured from a different viewpoint than the viewpoint chosen by the user with his mobile device, the app *won't* find a match. This isn't a problem with scanning old-fashioned QR codes. Storing *multiple* target images for a single scene/object is one way to minimise this problem but it all adds to the development complexity.

Dynamic screen capture

When an application program needs to be simulated or demonstrated to learners, there are many tools which will capture the computer screen activity (or an area of it) together with a narration, and let you edit the resulting video file. I have found the most capable tool to be *Camtasia Studio* - easy to use, a huge range of facilities, robust and flexible.

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спасибо

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- Fresh eLearning approaches, concepts and ideas
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