

IMPLEMENTATION OF VIRTUAL LECTURES IN POST-QUALIFICATION TRAINING IN EMERGENCY MEDICINE: A PILOT STUDY

Christopher Barlow and Sean Lancaster
School of Computing and Communications
Southampton Solent University

Iain Beardsell
Department of Emergency Medicine
Southampton University Hospitals NHS Trust

Polly Long
School of Computing and Communications
Southampton Solent University
UK

Abstract

This pilot study assesses the perception by junior doctors of a pilot video lecture delivered online as part of their foundation training. The lecture used Chromakey technology to integrate the presenter, enabling increased levels of engagement and presentation quality compared with lecture notes or podcasts. The subjects reported the video lecture easy to learn from, helpful in time management, and an effective way of delivery. Several subjects found the lack of interaction with the lecturer problematic and the cohort was undecided as to whether they would prefer their whole induction to be delivered using e-learning.

Background

Following university qualification in medicine, junior doctors are required to undergo further general and specialist clinical training for a number of years after graduating. Junior medical staff working in hospitals in the UK rotate regularly through different departments, sometimes as frequently as every four months. Each of these areas requires specific skills and knowledge to enable doctors to practice safely. Supplying this training through traditional education methods can be a challenge.

The Emergency Department (ED) is a unique environment where these doctors, often only a year after graduation from medical school, will be assessing undifferentiated, potentially very unwell patients with a degree of independence in a time pressured

environment. As the demand for emergency medical care is constant, the ED must function efficiently and effectively throughout this induction period.

In recent years, with the implementation of the EU working time directive to the medical profession (Swanwick & McKimm, 2009), and the increasing time demands on medical academics, there is “less time available for teaching than has previously been the case” (Ruiz, Mintzer, & Leipzig, 2006, p. 207). As the Higher Education sector has largely adopted e-learning and blended learning methodologies (Ellaway & Masters, 2008), university medical schools at undergraduate level have generally adopted a wide range of educational practices, including simulation, distance and e-learning (Howe, Campion, Searle, & Smith, 2004).

Post-qualification medical training in the UK, however, is usually run by the hospitals, and has historically been supplied through a series of lectures (totalling about 20 hours) delivered by senior doctors from the ED. This depletes the clinical area of medical staff and may impact on care provision.

Swanwick analysed the educational provision in postgraduate medical training and stated that “learning. . . occurred in an idiosyncratic and haphazard fashion, supported by often serendipitous access to formal educational events” (2009, p. 126). In most hospitals, junior doctors’ education is delivered in a ‘synchronous’ manner, in which learning activities for the group are simultaneous and on a fixed timetable (Wentling et al., 2000), based around weekly formal lectures and seminars. Due to the requirements of shift working and leave patterns, in any given week a significant number of junior doctors will be unable to attend the lecture or seminar. This is particularly the case in Emergency Medicine, and Carley and Mackway-Jones (2007) report that only 30% of junior doctors were able to attend regular weekly teaching.

“New technologies have made the walls of the learning space transparent” (Naidoo, 2001, p. 12) allowing students to access materials remotely and at their own convenience. In particular, e-learning lends itself to asynchronous delivery, where the “transmission and receipt of information do not occur simultaneously” (Ruiz et al., 2006, p. 208). This allows participants in the learning activity to be self-managing and able to pace their learning to their schedule. However, UK hospitals have traditionally not been set up for this type of learning activity, and developing it “requires faculty competencies which go beyond traditional instructional activities” (Ruiz et al., 2006, p. 207). However, recent research suggests that computer-based learning can be as effective as lecture-based teaching for foundation level doctors (Davis et al., 2007), and several papers have recently suggested that the move to e-learning is inevitable due to pressures on clinical time.

The Southampton Emergency Medicine Education Project (SEMEP) aims to change the way in which junior doctors engage with their postgraduate medical training, by moving away from the traditional lecture delivery towards asynchronous delivery of materials using e-learning technology. In an aim to maintain access to education for all doctors and ensure a consistently high standard of care for patients we hypothesised that making

educational materials available on the internet, where they can be accessed at a time convenient to the doctor, may be preferential to the learner compared to traditional face-to-face methods, and may help learning (Roe, Carley, & Sherratt, 2007).

This approach offers key advantages over the traditional lecture/observation. It allows more time for discussion and exploration of topics during formal seminar sessions, rather than using the time for content delivery (Davis et al., 2007). While some researchers claim that e-learning materials such as video lectures can lead to passivity in the learner (Weller, 2003), adult educational theory suggests that postgraduate learning is driven by self-motivation, and that this group may be more likely to engage at a high level than other learners (Coomarasamay & Khan, 2004), making use of the ability to “pause or revisit areas of the session.”

A key requirement of e-learning materials is the development of the materials themselves. It is not generally possible to use the same materials that would be used in a conventional face-to-face lecture in an e-learning environment (Ruiz et al., 2006). Roe et al. report that “A common mistake during the adoption of e-learning is to simply transfer educational materials from the classroom to the web and assume that learning will occur” (2007, p. 101).

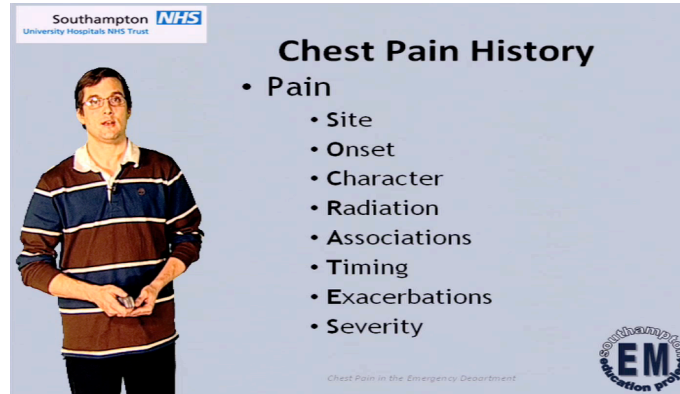
One issue with many online learning materials is the difficulty in engaging the student. Human communication relies on a considerable amount of non-verbal information. In the lecture theatre, the presenter’s facial expressions, body language and movement all contribute significantly towards the communication of ideas and concepts. The commonly used methods of “podcasts” for online learning are presented without visuals, while slideshows with accompanying commentary still lack the personal interaction.

Method

The pilot study involved creating a short video lecture on a specific key diagnostic issue (“chest pain”) that junior doctors are likely to come across in the Emergency Department. Several studies have indicated that the ability of students to retain information from a lecture significantly drops after 15–20 minutes (Wankat, 2002), so the lecture was restricted in duration to under 20 minutes.

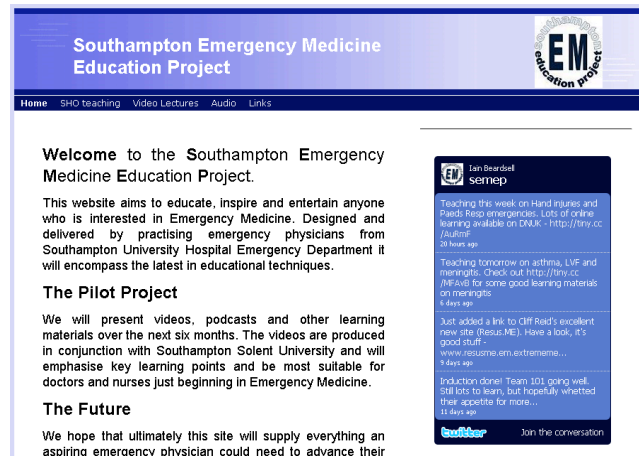
The key innovative aspect of this study was the application of Chromakey (green screen) technology, when recording the virtual lecture, thus allowing the integration of a ‘real’ presenter along with the visual aids (Figure 1). This allowed a higher quality of presentation when compared with video recordings of a lecture. It also allowed the presenter to interact effectively with the material in the presentation, being able to highlight information in slides and communicate using facial expressions and gestures as well as speech, much as would be done in a conventional lecture.

Figure 1: Screenshot from one of the video lectures



The video was trialled with two groups of 25 Senior House Officers (SHOs — US Intern equivalent) in their foundation programme in Emergency Medicine at Southampton General Hospital, as well as with a small group of Registrars (US Resident equivalent). An e-learning website (Figure 2) was set up which allowed remote access to introductory materials, podcasts and other useful materials in addition to the video lectures. Access was password controlled. The subject material was delivered to the groups using both face-to-face lectures and video lectures to all of the subjects. One group viewed the materials after receiving the ‘traditional’ mode of learning, and the other had it integrated into the first two weeks of their clinical training.

Figure 2: Screenshot of the web delivery platform



Data collection was based on the use of 14-point independent electronic questionnaires, in which the subjects were asked to assess their perception of the materials from a qualitative perspective in relation to learning quality and time management, their modes, and places of access. Questionnaire data was anonymised, with the only identification questions on the form being gender and age group.

Two questions were for basic demographic data (gender and age group), and four questions assessed access mode (type of interface and internet connection used, and how the video was watched). The remaining 8 questions were attitudinal, assessing motivation and engagement, and were all based on a 5-point Likert scale. Candidates were also encouraged to give ‘free comments’ about their personal interaction with the pilot materials.

The project was given ethical approval by the Southampton Solent University research ethics committee.

Results

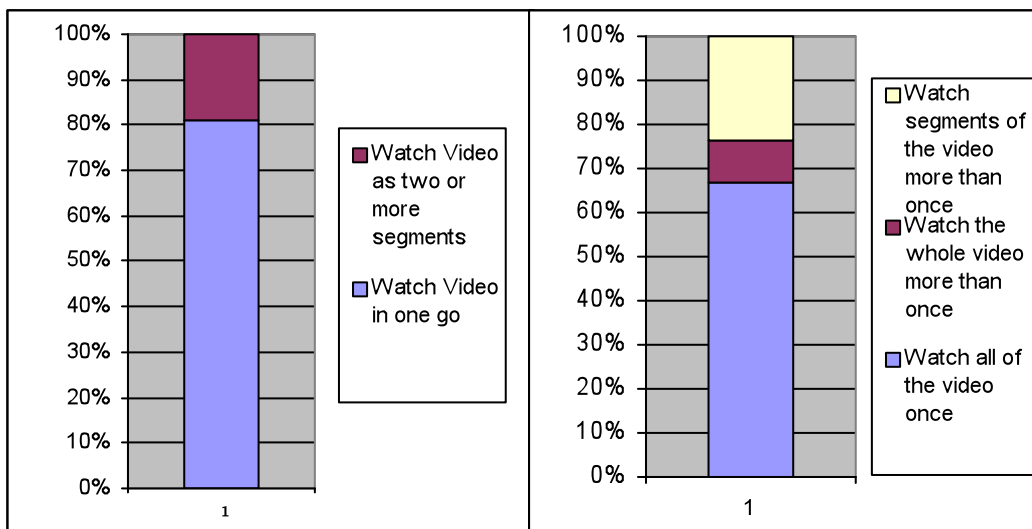
Of the 21 subjects completing the electronic questionnaire, 11 were female and 10 male. The majority were in the 26–32 year age group, with 3 falling into the 18–25 category and 4 in the 33–40 category.

Access Mode

Figure 3 shows that a large proportion (81%) of respondents viewed the video material for the first time in a single viewing, rather than breaking it up into sections. However, 33% of the subjects indicated that they viewed all or some of the material more than once, with 23% viewing sections of the video more than once.

This suggests that a significant proportion of the doctors were making use of the flexible delivery of e-learning to extract more information from the lecture than would be possible with a single traditional presentation.

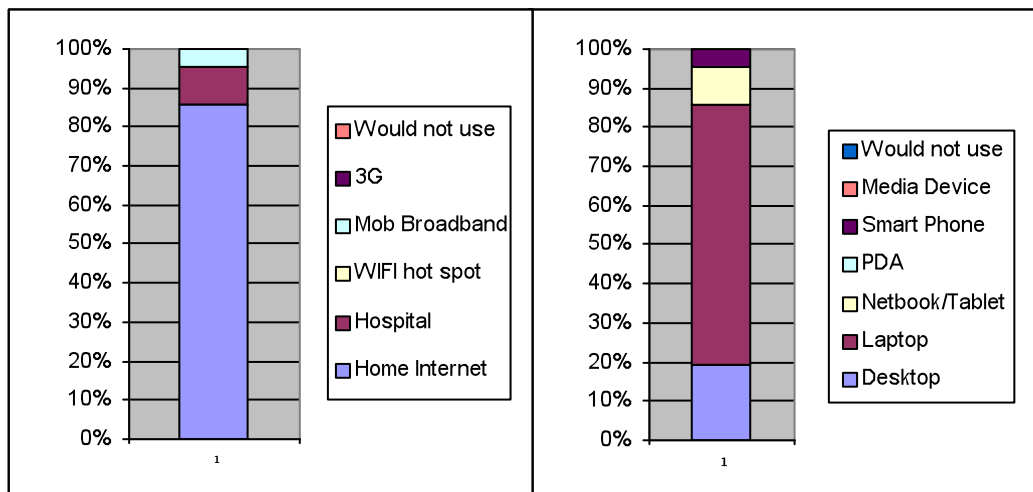
Figure 3: Mode of viewing video material



Access Method

In order to assess how future material would be best presented, subjects were asked what platform they would be most likely to use to access the materials, and what type of internet connection they would be most likely to use. As shown in Figure 4, the preferences for access to the material was very 'conventional', with the majority of respondents stating preference for use of either desktop or laptop computers, on a home or work internet connection.

Figure 4: Preferred Internet connection (L) and platform of access (R)



The proportion of doctors who would be likely to access the material using a mobile device and/or a remote/mobile internet link was extremely small. This suggests that the site and materials will be best developed in the future for optimal presentation on a large screen and fast connection, as opposed to being optimised for a mobile device and remote (i.e. slower) connection. This has significant impact on the quality of the materials that it is possible to develop, such as text and image size and definition.

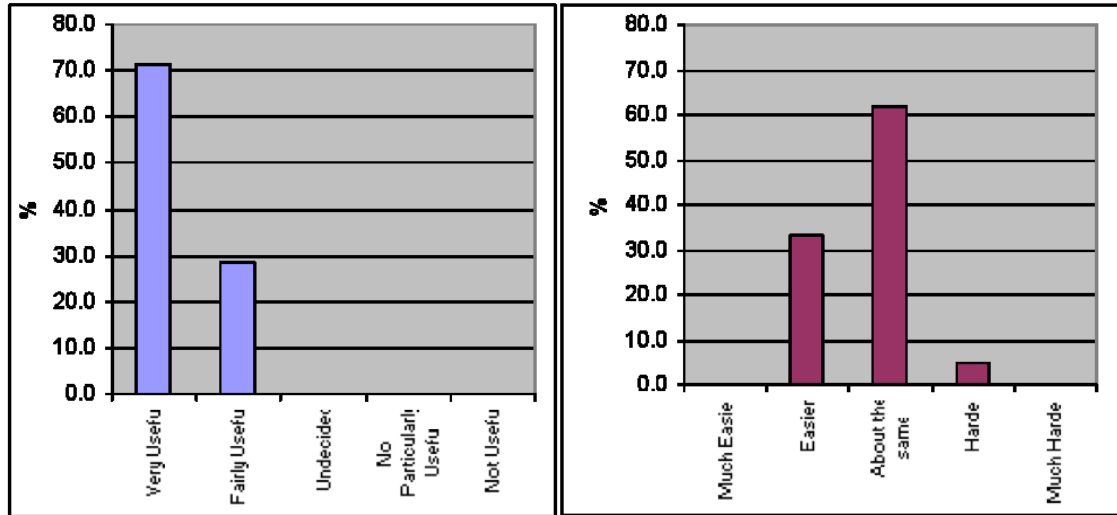
Perception, Learning and Time Management

Subjects were then assessed for their perceptions of the video lecture as a learning tool, in particular whether they found it generally useful as a learning mechanism, whether they felt the learning was more or less effective than face-to-face methods, and whether they felt that it would be helpful for time management. All questions used a 5-point Likert scale.

Figure 5 shows how the subjects rated the materials in terms of 'usefulness' relating to professional development and 'ease of learning' when compared to face-to-face lectures. The overall response to the video lecture was highly positive, with all subjects rating the material as either 'fairly' or 'very' useful as learning materials. The perception of whether the lecture was easier or harder to learn from than conventional lectures was

more balanced. However, the majority of subjects rated the material as either 'easier' (33%) or 'about the same' (62%) to learn from when compared to a face-to-face lecture, suggesting that there would be no detrimental effect upon their learning if the video lectures were used more extensively.

Figure 5: Ratings of 'Usefulness' (L) and 'Ease of learning' (R) of the video lectures

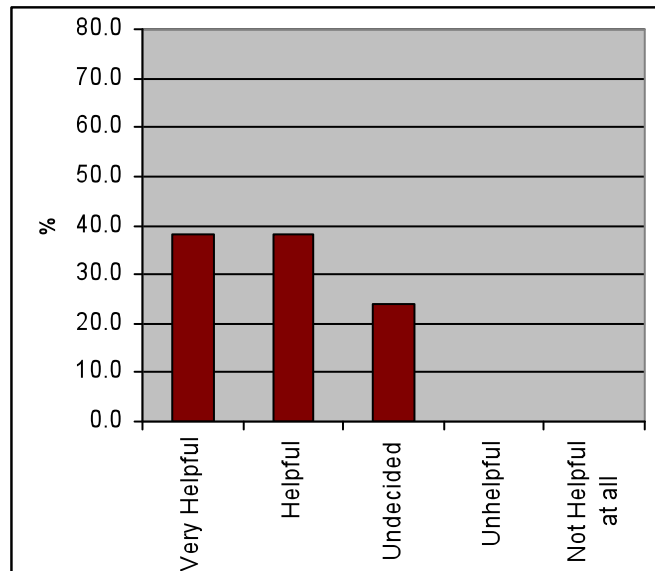


Interestingly, when cross correlated against the results for mode of access, of the respondents who repeated or segmented their viewing 90% rated the video lecture as 'very useful' and 55% of this group also rated the lecture as 'easier' to learn from than conventional lectures.

Of the subjects who only viewed the material once, and viewed straight thorough, the proportion rating the material as 'very useful' drops to 54%, while the proportion rating the material as 'easier' to learn from falls to 18%. This would appear to indicate that the mode of use of the material has a significant impact on the learning experience.

Figure 6 shows the ratings given to the material in terms of helping with time management. The majority of doctors felt that video lecture would be 'very helpful' or 'helpful' with time management, with the remainder undecided. There were no negative responses to the perception of time management.

Figure 6: Responses to ‘Helpfulness’ of video lecture in terms of time management delivery and curriculum

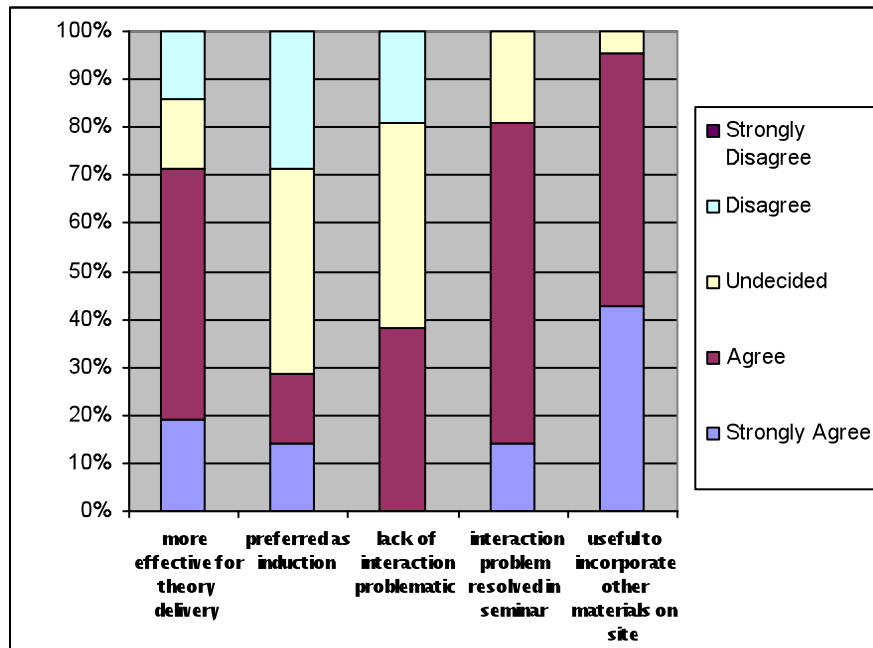


A series of questions examined the learners concerns and preferences with regard to the use of web delivered video lectures as part of their learning curriculum. These questions examined:

- Whether it would be more effective to deliver theoretical material using video lectures and reserve timetabled sessions for seminars and discussions?
- Whether they would have preferred their initial training to have been completely delivered in this manner?
- If it would be a problem not having interaction with the lecturer for the ‘lectures’?
- If this was the case, would it be resolved by having structured seminars linked to the ‘lecture’?
- If they would find it useful to have a range of learning materials including online testing to accompany the videos?

The responses shown in Figure 7 indicate a marked preference for a ‘blended’ approach, in which more theoretical material is delivered using a video lecture, allowing subjects to study the material in their own time, and make use of the flexibility of the learning tool. However the group acknowledges problems with the lack of interaction with the lecturer and feel that this would be eliminated by using timetabled sessions for seminars and tutorials.

Figure 7: Perceptions of use of virtual lectures



Discussion

Whilst the results partly reflect the widespread enthusiasm for e-learning strategies in most fields of post-graduate medicine teaching (Harden, 2006), the link between access mode and usefulness suggests that they indicate more benefits than just improved time-management. The highest satisfaction was amongst learners who appeared to be using the non-linear nature of the videos as an effective mediation tool to help construct their learning of individual tasks, a central tenet of the constructivist theory of learning (Huang, 2002).

It is also important to consider the benefits afforded by the opportunity to revisit parts, or all, of the lecture material at a later time. Firstly, this empowers the learners to choose not only when and where the learning takes place, but also how much is undertaken at each attempt — this attribute of being able to independently influence the resources for learning being commonly identified as important to adults (Brookfield, 1986). Subjects particularly reported the benefits of the ability to catch up on and review materials more than once:

I think video lectures are a great substitute for those who could not attend and great to review later to refresh my memory.

Secondly, it has been shown that reflection is central to effective professional learning (Moon, 2004), and this is difficult with traditional face-to-face lectures that are once-only delivery.

It could be argued that the opportunity to interact with the lecturer in the traditional mode of delivery can actually discourage reflection, as the learner can seek instant answers to their questions rather than spend time reviewing the taught material and constructing their own knowledge. The non-linear and asynchronous nature of the videos both encouraged and enabled the subjects to reflect on the content effectively, as evidenced by their general satisfaction with the lack of direct interaction. There are also indications that follow-up seminars benefited from the additional reflection that had taken place. The results show that most interaction problems are resolved in seminar sessions, suggesting that these sessions were particularly effective.

The success of the study is most clearly indicated by the response to the question assessing the effectiveness of the video for the delivery of theory. This is likely to be influenced both by the positive learning experiences of using the video and the value the subjects attribute to reserving time for face-to-face teaching. As outlined above, this goes beyond allowing the face-to-face time to be solely focussed on elements that require interpersonal interaction, such as practical skills, as has been suggested in other studies (e.g. Roe et al., 2008). Rather it maximises the effectiveness of this time in seminar sessions by allowing the doctors to concentrate on the areas of theory that require clarification.

The subjects are less convinced about its use as the delivery method for initial training, but this may be due to unfamiliarity. One remarked that it was “Difficult to interact with a video, easier to switch off,” while another commented that “Personally I prefer seminar lectures with discussions as I can concentrate on them much better, follow them easier, can relate with the lecturer.” All of the subjects of this study had undergone or were undergoing a ‘traditional’ induction in which the majority of their training was based on a face-to-face structure. Subjects without this prior experience may well have provided a more positive response.

Conclusion

The key questions that this pilot aimed to examine were: 1.) will junior doctors find the use of e-lectures preferential to face-to-face lectures? and 2.) did they feel that is helped their learning compared to face-to-face lectures?

As these questions are subjective, there is a natural range of choices; however there was a significantly positive response to the materials, with all students considering the materials ‘useful’ or ‘very useful’, and the majority (72%) considering this both a more effective method of theory delivery than face-to-face lectures, and ‘helpful’ or ‘very helpful’ for time management (72%). While many subjects (62%) rated the lecture as ‘about the same’ as face-to-face lecture in terms of easiness to learn from, 33% rated it as easier. Overall the indication is that the doctors either preferred e-delivery, or rated it about the same as face-to face learning, and therefore the research questions were both answered positively.

The most likely to view the materials in a negative manner were those who had not taken the opportunity to review the material more than once, while those who had used the flexibility of the e-delivery to view the materials in segments or repeat the lecture in whole or in part were most likely to give a positive rating, particularly in terms of how easy the lectures were to learn from.

Future Work

Given the positive results of the pilot study, it is now progressing into its second stage which is to develop an entire induction programme using a blended approach, in which 20 lectures are delivered online and then supported with face-to-face seminars and a range of other e-learning materials. Results of the larger study will be reported at future meetings.

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