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GUIDELINES

A Framework for Technology Enhanced Learning

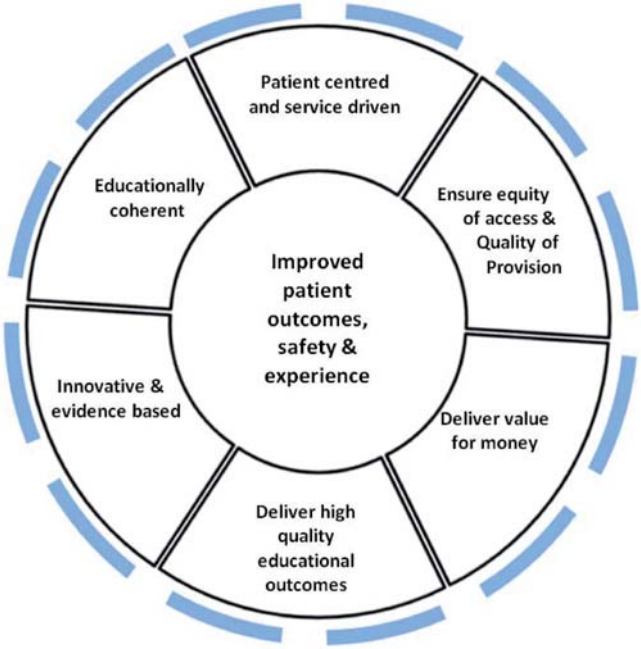
Department of Health/Workforce, UK*

**Corresponding author: workforceeducationandtraining@dh.gsi.gov.uk*

Abstract

This document provides a framework for commissioners and providers of health and social care focusing on the use of technology as part of a managed learning process. Innovative educational technologies, such as e-learning, simulation and smart-phones, provide unprecedented opportunities for health and social care students, trainees and staff to acquire, develop and maintain the essential knowledge, skills, values and behaviours needed for safe and effective patient care. As part of managed learning processes, which blend these technologies with other learning methods, students, trainees and staff can progress from novice to expert. This framework describes what steps should be taken to extract maximum value from e-learning, simulation and other technologies to support learning across the health and social care sector. It is structured around six principles: (a) be patient-centred and service-driven; (b) be educationally coherent; (c) be innovative and evidence-based; (d) deliver high quality educational outcomes; (e) deliver value for money; (f) ensure equity of access and quality of provision. The benefits of collaboration and cooperation to achieve economies of scale, capacity and expertise are highlighted.

Keywords: *healthcare provision; educational technology; simulation; e-learning; clinical competence; healthcare policy; medical education*



Foreword

Simulation and simulated tasks have been used in medical, nursing and dental education for at least the last 50 years and e-learning has played a significant role for the last decade. As we embrace new technologies and refine existing approaches, it is essential that we review appropriate provision and use to ensure that we equip the workforce with the necessary capabilities for safe and effective patient care. This Framework, which has drawn upon expertise from the health and social care sectors, does just that.

The Framework sets out a clear vision for technology enhanced learning across health and social care, grounded in six key principles that should underpin the world-class education to which we aspire. Technological approaches should be used to enhance learning where there is a clear benefit to patient care. As my predecessor, Sir Liam, highlighted in his 2008 Report, simulation offers an important route to safer care for patients and must be more fully integrated into the health service. Therefore, this framework clearly states that healthcare professionals, as part of a managed learning process and where appropriate, should learn skills in a simulation environment and using other technologies before undertaking them in supervised clinical practice.

Patient care depends on high functioning teams. We must ensure that technological approaches are used to support teams training together. Simulation in particular allows teams to practise safely and reduces the risk of complications for patients. E-learning allows team members to enhance their knowledge and understanding, which prepares them for simulated and real performance. Portable media can enable learners to record their experiences in community and hospital settings. This means we must remove the barriers to learning for all members of the team and ensure equality of opportunity.

We need to build on our current evidence base and evaluate how technological approaches to learning can continuously improve patient care. The National Institute of Health Research (NIHR) has already funded a number of research projects evaluating the role of innovative technologies to support the development of both individual learners and teams.

Improving patient safety, outcomes and experience is paramount and this depends on addressing the learning needs of the health and social care workforce. The principles and recommendations set out in this Framework should inform the decisions of providers and commissioners when considering what role technological approaches should play in equipping their workforce with the necessary capabilities across care pathways.

DAME SALLY C DAVIES
CHIEF MEDICAL OFFICER
CHIEF SCIENTIFIC ADVISOR

Executive summary

i. This document provides a framework to help commissioners and providers of health and social care deliver high quality, cost effective education, training and continuous development to the workforce for the benefit of patients.

ii. While this framework focuses on the use of technology as part of a managed learning process, appropriate expert supervision of students and trainees, particularly in clinical practice, remains essential for ensuring patient safety and must be afforded the highest priority in education and training.

iii. Innovative educational technologies, such as e-learning, simulation and smart-phones, provide unprecedented opportunities for health and social care students, trainees and staff to acquire, develop and maintain the essential knowledge, skills, values and behaviours needed for safe and effective patient care.

iv. As part of managed learning processes, which blend these technologies with other learning methods, students, trainees and staff can progress from novice to expert. This integrated approach to education, training and continued development, equips the health and social care workforce with the expertise needed to improve constantly patient outcomes, safety and experience. It is needed to ensure that the workforce deliver the highest possible standard of care as expected by patients and their carers.

v. The health and social care sector, including education providers, Strategic Health Authorities and the Department of Health, have made substantial investments in e-learning and simulation to support student, trainee and staff learning. Underpinned by research, students, trainees and staff are using these technologies to support their learning. Examples include: e-learning to develop their knowledge and understanding of child protection, virtual

reality simulations to develop their surgical skills, skills labs to demonstrate their competence in undertaking clinical procedures before engaging in supervised clinical practice and high fidelity simulation facilities to model different team approaches to managing patients along integrated care pathways.

vi. However, there is significant variation in the provision and use of e-learning, simulation and newer technologies both geographically and between disciplines. Research suggests that simulation and e-learning together with high quality supervision has the potential to improve confidence and competence. However, the opportunities for multidisciplinary and interprofessional learning are not being fully exploited.

vii. Anticipating changes in how the NHS will be organised, this framework describes what steps should be taken to extract maximum value from e-learning, simulation and other technologies to support learning across the health and social care sector.

viii. Informed by the best available evidence, reviews of current provision and use, and with input from students, trainees and staff, this framework is structured around six principles:

(a) Be patient-centred and service-driven – *technological applications must focus on equipping the workforce with the necessary skills for safe and effective patient care*

(b) Be educationally coherent – *any technological application should address clearly articulated learning needs that are aligned to service needs.*

(c) Be innovative and evidence-based – *applications should enhance training, be informed by the best available evidence, and where possible be future-proof by being flexible and adaptive so minimising redundancy.*

(d) Deliver high quality educational outcomes – *meets and, wherever possible, exceeds agreed standards*

(e) Deliver value for money – *technological applications should enhance training, improve productivity, reduce duplication and be affordable and cost effective*

(f) Ensure equity of access and quality of provision – *applies across the health and social care workforce*

ix. This framework is aimed at the health and social care workforce, and providers and commissioners of education and training including healthcare providers, social care providers, and other education providers. While recognising the value of local ownership and diversity, the framework highlights the benefits of co-operation and collaboration. It identifies some of the national resources that are currently available. These coordinated solutions represent economies of scale, capacity and expertise and are more likely to be cost effective than fragmented local provision. The recommendations are set out below:

Recommendations

A. Patient-centred and service-driven

- **Recommendation 1:** As part of a managed learning process and where appropriate, healthcare professionals should learn skills in a simulation environment and using other technologies before undertaking them in supervised clinical practice.

- **Recommendation 2a:** Healthcare, social care and education providers should identify a lead to ensure that students, trainees and staff have appropriate access to technological applications to support their learning. The lead should ensure that the technological applications are used appropriately to meet clearly defined curricular, patient and service needs.

- **Recommendation 2b:** Local networks of healthcare, social care and education partners should identify a strategic lead for technology enhanced learning with responsibility for ensuring appropriate use, value for money, equity of access and demonstrable benefits to patients and service.

- **Recommendation 3:** Those purchasing technological solutions to support learning should undertake regular review to ensure that they continue to meet clearly defined patient and service need, support the health and social care workforce in their specific learning objectives and provide value for money.

- **Recommendation 4:** Healthcare, social care, and education providers should provide appropriate access for all their students, staff and trainees to a system to manage, record and evaluate their learning for example through a learning management system.

B. Educationally coherent

- **Recommendation 5a:** Organisations involved in developing curricula or similar learning frameworks should

identify a strategic lead for technology enhanced learning.

- **Recommendation 5b:** Those responsible for developing curricula or similar learning frameworks should recommend what role simulation, e-learning or other technologies should play to support learning and assessment. They should highlight and describe the opportunities for the use of technology. They should indicate how to facilitate multidisciplinary and interprofessional learning in the delivery of their curricular or similar learning framework outcomes.
- **Recommendation 5c:** The use of simulation, e-learning and other technologies should be achievable and clearly mapped to specific learning outcomes in identified areas of the curriculum or learning framework.
- **Recommendation 5d:** Simulation, e-learning and new technologies should not be used as an end in themselves, but appropriately integrated in a blended approach to learning and implemented to address specific learning or clinical needs.

C. Innovative and evidence-based

- **Recommendation 6:** Healthcare, social care and education partners should aspire to educational excellence by encouraging innovation, evaluation (including benefits realisation) and the dissemination and adoption of evidence-based, good practice.

D. Deliver high quality educational outcomes

- **Recommendation 7:** There should be a clear statement of the purpose of the facility, equipment or content identifying the target group(s), expected learning outcomes and, where appropriate, guidance on its use.
- **Recommendation 8:** Healthcare, social care and education providers should ensure that educators and trainers are competent to use the required simulation facilities or equipment, e-learning and any other technological tools.

E. Deliver value for money

- **Recommendation 9:** Healthcare, social care and education providers should work collaboratively to share resources, to maximise their purchasing power and increase opportunities for multidisciplinary and interprofessional training across the entire care pathway.
- **Recommendation 10a:** A national register covering e-learning modules, simulation scenarios and toolkits should be maintained to provide the facility to search for existing tools or projects in development.
- **Recommendation 10b:** Healthcare, social care and education providers, either individually or working collaboratively, should search the register before developing or procuring any new technologies to support learning to reduce duplication and secure value for money.

F. Ensure equity of access and quality of provision

- **Recommendation 11:** Content to support e-learning on computers or mobile devices should be developed according to agreed technical standards to ensure easy access across different learning management systems.
- **Recommendation 12:** Healthcare, social care and education providers should ensure that they can demonstrate equity of access and quality of provision through effective local educational governance mechanisms considering feedback from students, trainees and staff, and to the satisfaction of the relevant professional regulator, where applicable.

1. Introduction

1.1. Education, training and the ongoing development of the health and social care workforce are integral to the improvement of patient outcomes, safety and experience. Health and social care providers, working in partnership with education commissioners and providers, are committed to ensuring that students, trainees and staff have access to the highest quality education, training and development they need to improve patient care and enhance productivity.

1.2. The term patient is used throughout this framework to describe the intended beneficiaries of improvements in service delivery and education. It is recognised that different terms are used to describe those using health and social care services such as service users, clients, patients, carers and their families. However, for simplicity the term patient is used to describe all of these partners.

1.3. The users of the technological applications, which are the focus of this framework, are health and social care students, trainees and staff. This includes all members of the health and social care teams. For simplicity, the term 'health and social care workforce' is used to describe 'health and social care students, trainees and staff.'

1.4. Innovative technologies such as e-learning and simulation have already enhanced learning, enabling

the health and social care workforce to rehearse skills and train more flexibly. As part of a managed learning process these resources aim to ensure that patients are cared for by staff with the right skills at the right time. Further technological advances have the potential to make additional improvements to the effectiveness and efficiency of learning and patient care. This framework aims to enhance the quality of workforce education, training and development for the benefit of patient care.

1.5. While this framework focuses on the role technological applications should play in the education, training and development of the health and social care workforce, many of these resources could be used or adapted for use by patients.

1.6. Anticipating changes in how the NHS will be organised, this framework describes what steps should be taken to extract maximum value from e-learning, simulation and other technologies to support learning across the health and social care sector. It is informed by the best available research evidence and by reviews of the current provision and use of e-learning and simulation.

1.7. This good practice framework builds on the work of health and social care providers, education providers, Strategic Health Authorities (SHAs) and the Department of Health (DH). It was developed under the auspices of the Workforce Availability Policy and Programme Implementation Group (WAPPIG), which brings together the DH and SHA workforce leads. The members of the Project Board and the Framework Development Group are listed in the appendices.

The use of technology in learning

1.8. Technology has an important role to play in the continuum of managed learning processes. These processes draw upon a range of educational techniques including large group and small group teaching, experiential learning, e-learning, simulation, social networking, smart-phones, virtual reality and virtual worlds. Technological applications such as e-learning and simulation typically form part of a blended approach to learning, which combines a range of different educational methods to support learning e.g. e-learning, face to face and experiential learning. As learners move from novice to expert they draw upon different learning methods, including multidisciplinary and interprofessional learning, to prepare them for work as members of capable health and social care teams.

1.9. For the purposes of this framework, technology refers to the use of 'information technology', such as computers, handheld devices, simulators and simulation facilities for individual, group, multidisciplinary and interprofessional use.

1.10. This framework focuses on three particular types of technology: e-learning, simulation and newer (in particular mobile) technologies. However, technological applications should not be seen as a substitute for other methods of learning but as a means of providing enhanced learning as part of a managed and integrated learning process for the benefit of patient care. In particular, simulation and e-learning cannot replace supervised education, training and continued development in the workplace but instead complement other approaches as part of a managed learning process.

E-learning

1.11. The term 'e-learning' encompasses a wide range of technological applications and educational approaches. It includes any learning taking place on a computer, usually attached to a network, either locally or via the internet. E-learning may also cover a wide array of educational techniques, such as tutorials, online discussion groups, virtual patients and virtual worlds. The term 'e-learning' can also include newer technologies such as social networking and blogging.

1.12. E-learning can be both synchronous, where all participants engage with the learning material at the same time (and usually overseen by a facilitator), or asynchronous, where material is worked on individually at different times and in different places.

1.13. If properly implemented, e-learning is as effective as more traditional methods of education.[1] One of the particular advantages of e-learning is that it can be accessed at a convenient time for the learner. This can free up 'time to care' for frontline staff as the time taken for e-learning can be shorter than the aggregated time of travel and participation in traditional methods. E-learning has been shown to support improvements in learner and patient behaviours, including: communication skills,[2] procedural skills[3] and patient adherence to prescribed medication.[4]

Simulation

1.14. As with e-learning, the definition of 'simulation' is complex. It refers to any reproduction or approximation of a 'real' event, process, or set of conditions or problems. In this sense, learners are expected to evaluate and act in the same way as they would in the real situation, thereby supporting learning in a 'patient safe' environment, as well as potentially increasing competence by deliberate and repeated practice. Simulation is also used for the assessment of the level of competence of individuals and teams.

1.15. Provision of feedback and performance debriefing are integral and essential parts of simulation-based education.[5] It can offer insights into the development of individual non-technical skills, teamwork function and leadership skills. However, simulation-based education can be stressful and it is essential that simulation trainers are able to support learners and provide constructive feedback.

1.16. The DH commissioned *NHS Simulation Provision and Use Study* reported that many healthcare and education providers have on-site simulation resources with more specialised facilities provided by a smaller number of education providers.[6] These facilities support unprofessional, multidisciplinary and interprofessional learning.[7]

1.17. Simulation-based education has been used in healthcare for decades. For example, dental students have been using phantom heads and mannequins to learn practical skills before practising on patients since the 1950s. Every dental school now has a 'simulated dental learning environment' comprising a suite of dental chairs which allow students to deliver dental treatment in closely supervised simulated clinical surroundings (Fig. 1).

1.18. The evidence suggests that simulation can enable the workforce to acquire skills more efficiently when compared to relying on opportunities to gain these skills as part of routine clinical practice.[8] However, a blended approach is regarded as best educational practice.

1.19. Simulation training is often classified as either high or low fidelity. The 'fidelity' of simulation refers to how accurately or closely the simulation resembles the actual situation being reproduced. Simulation may be defined according to three categories of fidelity: environmental, equipment and psychological fidelity. Environmental fidelity refers to the realism of the environment in which simulation takes place for example a mock pharmacy. Equipment fidelity refers to how closely the hardware and other tools used and any software packages resembles what is used in clinical practice. The psychological fidelity is also of importance, i.e. how faithfully the simulation mimics the emotional and behavioural aspects of the real situation. The psychological fidelity does not necessarily depend on the use of expensive equipment or complex environments. For example, the use of simulation to mimic interactions between patients and health or social care students, trainees or staff may only require the use of recording equipment to support feedback and detailed review.

Figure 1 Simulated dental learning environment

1.20. High environmental and equipment fidelity (sometimes known as full immersion simulation) can be used to explore the influence of human factors in health and social care practice, by examining the impact of the environment, equipment and other system processes on individual and team performance. This aspect of using simulation can be linked to learning important lessons from serious patient harm events, which have been reported nationally. It can also be used to evaluate proposed changes in systems or processes of care within local or wider healthcare organisations.

1.21. Another widely used form of simulation is the 'simulated patient', where individuals, usually trained actors, mimic patient symptoms and problems to allow exploration of the learner's responses and communication skills in a standardised format. Simulated patients are often used in student and trainee examinations.

1.22. Figure 2 explores the role different types of simulation can play as part of a managed process whereby a learner moves from novice to expert. For example surgical trainees will use task trainers for suturing or developing their laparascopic skills before combining these tools with simulated patients to enhance the realism of the educational activity. As the trainee becomes more proficient, task trainers can be combined with simulated patients in either a real operating theatre or a simulated operating theatre ("in-situ simulation").

1.23. Simulation can also be used to promote and support excellence through continued development. Established professionals and teams can use a wide range of e-learning and simulation-based techniques to keep up to date and refine their practice. Technology-enhanced learning allows the workforce to engage in continued development both alone and as members of teams as they strive to become excellent. This ability of simulation to enhance performance through 'mission' rehearsal is widely used in other high-reliability organisations such as aviation and the military but has been less widely adopted in healthcare.[9]

1.24. There is significant overlap between e-learning and simulation. E-learning is often used to prepare for simulation to rehearse the knowledge base underpinning complex tasks. Computer animations, including virtual reality simulations, allow complex ideas, techniques or concepts to be explored. Simulations using Second Life™ and avatars have the potential to test new ideas and explore how professionals and patients interact with each other.

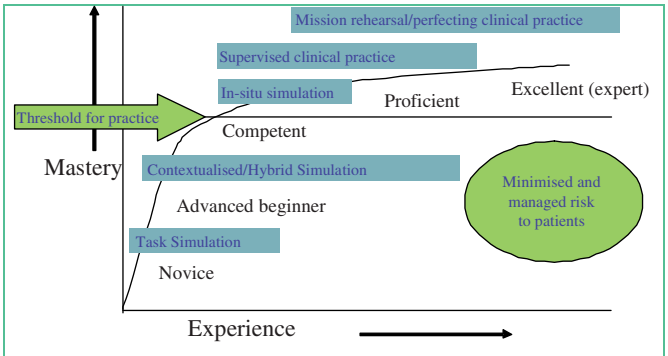


Figure 2 A simulation-enhanced learning trajectory. Curran I after Dreyfus HL, Dreyfus SE. Mind over machine: the power of human intuition and expertise in the era of the computer. Oxford; Basil Blackwell 1986.

New or emerging technologies

1.25. There are other types of technology used to support healthcare education such as smart-phones, podcasts and social networking sites.

1.26. Smart-phones, i.e. mobile phones capable of accessing the internet and running 'applications' or 'apps', are increasingly being used to support the delivery of health and social care and education and training. For example, health and social care students from five universities in Yorkshire are using mobile devices to complete and upload mobile assessments and feedback and access learning materials while on placements.[10]

1.27. Web-based tools, such as podcasts, are also used widely in undergraduate education, to provide 'bite-sized' chunks of educational material often focusing on presenting knowledge content. These resources can be accessed quickly, asynchronously and easily at a time to suit the learner.[11]

1.28. The huge impact of social networking (such as Facebook and Twitter) on methods of communicating and establishing networks has also begun to gain footholds in health and social care education, training and development. But these technological applications raise confidentiality issues and need appropriate monitoring and moderation which can be labour intensive and expensive.

1.29. Information governance, particularly in terms of patient data protection, is critical, not only in mobile and web-based technologies, but in the use of technology to support learning as a whole.

Policy context

1.30. Over the past ten years, the DH has highlighted the potential value of technology in the education, training and development of the health and social care workforce. *A High Quality Workforce,* identified the "need to use modern education techniques if we are to fulfil our ambition to widen participation in learning and to enhance the learning environment for both those in training and those undertaking continued professional development".[12]

1.31. Responses to the White Paper consultation *Liberating the NHS: An Information Revolution* stressed how a revolution in the use of information and IT in health and social care services can demonstrate both greater efficiency and improved quality of care.[13] In addition, respondents also highlighted the importance of leadership, culture change and

education of staff to take this agenda forward. DH is using the responses to the consultation and from the listening exercise to develop an Information Strategy, which will be published shortly. This Framework for Technology Enhanced Learning will play a role in helping to deliver that broader agenda.

1.32. This good practice framework builds on the review of: "the appropriate use of e-learning and other modern education techniques, such as high-fidelity simulation suites" and describes, "The appropriate use of e-learning, simulation, clinical skills facilities and other innovative approaches to healthcare education".[12] It recognises that significant investment has already been made in Learning Management Systems for e-learning, in the development of e-learning content and in the provision of simulation and clinical skills facilities. It brings together the current best evidence from both policy and the scientific literature.

1.33. It also aims to address issues that have been raised in recent reports on medical education and training, such as Sir John Temple's report "A Time for Training"[14] which reported on the impact of the Working Time Directive and the report by Professor John Collins evaluating the medical Foundation Programme.[15] In both of these reports, it was noted that doctors in training sometimes feel that they are required to act beyond their level of competence. Consequently, the framework addresses the appropriate use of technology, as part of managed learning processes.

1.34. Appropriate expert supervision of training remains essential to ensuring patient safety and should be afforded the highest priority.

Target audience

1.35. The recommendations in this good practice framework are aimed at providers and commissioners of education and training, including healthcare providers, social care providers, and other education providers. It will also be of interest to the health and social care workforce.

1.36. The effective local implementation of these recommendations should ensure that continued high quality, technology-enhanced education, training and development, as part of a blended learning approach, can continue to be delivered and developed for the benefit of patient care.

2. Recommendations to support technology

2.1. Technology to support the learning of the health and social care workforce has an important role to play in improving patient care. This framework aims:

> "To enable world-class education, training and continued development that makes the best use of technology ensuring that the workforce acquire and maintain the knowledge, values and behaviours needed to improve constantly patient outcomes, safety and experience."

2.2. This vision is underpinned by six key principles, which have been developed in conjunction with partners (Fig. 3). The recommendations set out in this framework are mapped to these principles:

(A) Be patient-centred and service-driven – *technological applications must focus on equipping the workforce with the necessary skills for safe and effective patient care*

(B) Be educationally coherent – *any technological application should address clearly articulated learning needs that are aligned to service needs*

(C) Be innovative and evidence-based – *applications should enhance training, be informed by the best available evidence, and where possible be future-proof by being flexible and adaptive so minimising redundancy*

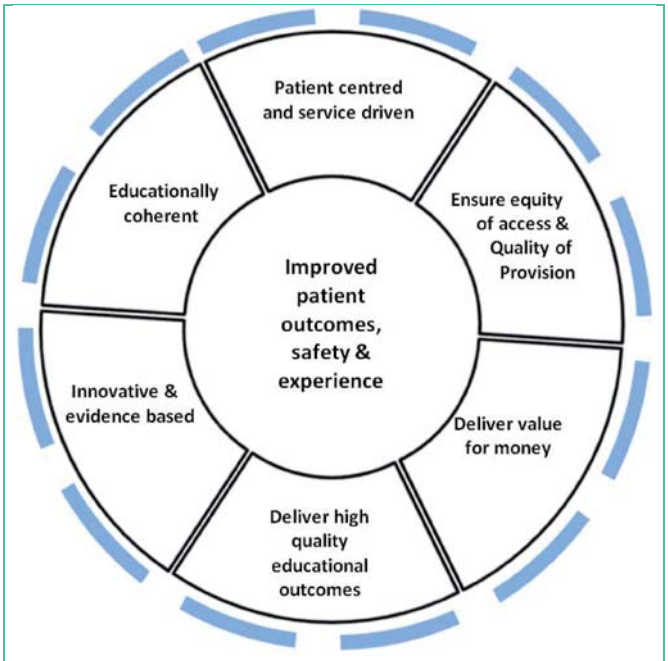


Figure 3

(D) Deliver high quality educational outcomes – *meets and wherever possible exceeds agreed standards*

(E) Deliver value for money – *technological applications should enhance training, improve productivity, reduce duplication and be affordable and cost effective*

(F) Ensure equity of access and quality of provision – *applies across the health and social care workforce*

2.3. The following sections provide more detail about current issues affecting the use of technology to enhance learning and set out recommendations that seek to address them. The sections are framed around the six principles with the intention of improving patient outcomes, safety and experience.

A. Patient-centred and service driven (Fig. 4)

2.4. The National Health Service (NHS) is committed to ensuring that patient care is at the heart of everything it does and that patient outcomes are among the best in the world. Improving patient outcomes, safety and experiences requires not only the improvement of systems of care but also the improvement of education, training and the personal development of the health and social care workforce.

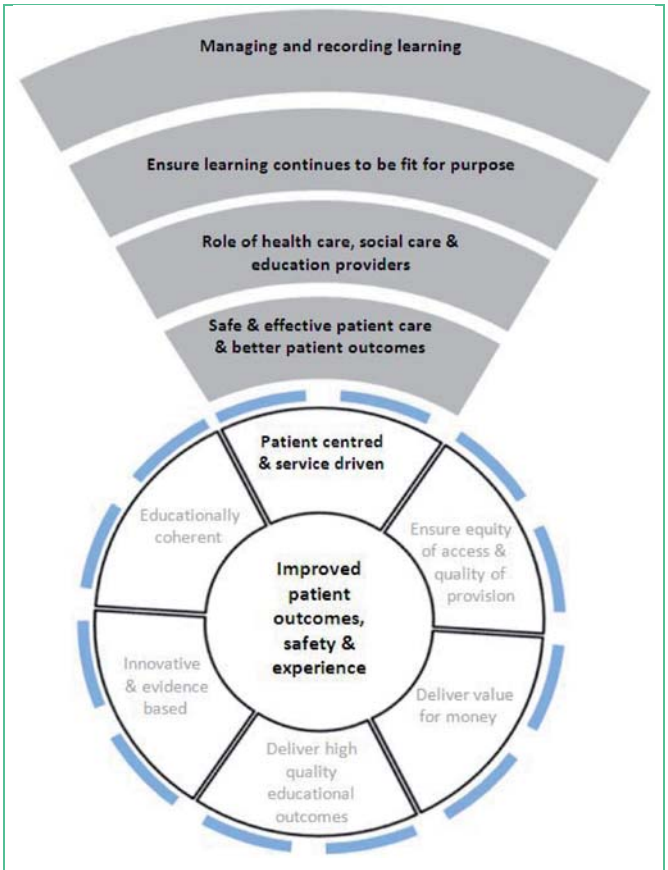


Figure 4

2.5. Innovative technologies such as simulation and e-learning have an important role to play as part of a blended approach to learning. Decisions to include innovative technologies as part of a managed learning process should be based on clearly articulated patient and service needs. The use of technology to enhance learning should be driven by the learning needs of the health and social care workforce for the benefit of patient care and not driven by the technology itself.

Safe and effective patient care; and a better patient experience

2.6. All health and social care providers and education providers are committed to improving patient outcomes, safety and experience. Innovative technologies such as simulation and e-learning have a key role to play in helping the workforce develop their skills from novice to expert. This should be augmented by appropriate feedback and build upon supervision in the workplace.

2.7. Employers are responsible for ensuring that all health and social care trainees, staff, and where applicable students, have the necessary skills to undertake their respective roles. Simulation and e-learning, which are typically part of a blended learning approach, can be used to initiate the development of competence in particular areas before they are performed in the workplace. This is not just limited to technical skills but includes non-technical and behavioural skills e.g. prescribing, time management, obtaining consent, breaking bad news. The use of simulation and e-learning is not a replacement for supervised practice but an adjunct to safe and effective practice.

2.8. Recent reviews of postgraduate medical training[12,16] and the recent General Medical Council (GMC) trainee survey[17] have highlighted that doctors in training sometimes feel that they are required to act beyond their level of competence. This includes undertaking clinical procedures. Of note, the GMC has updated its requirements for undergraduate and postgraduate medical education and training.[18,19]

For example, the GMC's quality assurance document, *The Trainee Doctor* states:

> "8.7 Trainees must be enabled to develop and improve their clinical and practical skills, though technology enhanced learning opportunities such as clinical skills laboratories, wet labs and simulated patient environments. Foundation doctors must have these opportunities, where they are supported by teachers, before using these skills in clinical situations."

2.9. The Nursing and Midwifery Council allows a maximum of 300 hours of the 2300 hours practice component of general nursing training to take place in a simulated practice learning environment.[20] Guidance is flexible about the form that simulation-based training may take. This has lead to proactive incorporation and development of simulation in general nursing training.

2.10. Similarly, simulation and other technologies are already used in the education and training of allied health professionals, dentists, healthcare scientists and pharmacists. For example, the DH funded forty Virtual Environment Radiotherapy Training (VERT) sites in England to enable student therapeutic radiographers develop their knowledge, skills and confidence as they prepare for supervised clinical practice.[21]

- **Recommendation 1: As part of a managed learning process and where appropriate, healthcare professionals should learn skills in a simulation environment and using other technologies before undertaking them in supervised clinical practice.**

The key role of healthcare, social care and education providers

2.11. Healthcare providers, social care providers and education providers have a key role to play in ensuring that their staff and students have access to high quality education, training and opportunities for personal and team development. Education, training and development should be timely and provide value for money. Face-to face delivery of training is not always feasible nor does it always adequately engage the health and social care workforce.

2.12. E-learning can allow learners to train at different times and at their own pace. Simulation provides a safe environment for health and social care students and staff to develop their skills. Students, trainees and staff can deliberately and repeatedly practice their skills either alone or as members of teams before being called upon to provide high quality patient care.

2.13. Healthcare providers and social care providers should take a strategic role around the provision of education and training and work in partnership with other providers, including higher education institutions, further education colleges, local authorities and the public. The adoption of innovative technologies to support learning will require both leadership from individual providers and partnership working.

- **Recommendation 2a: Healthcare, social care and education providers should identify a lead to ensure that students, trainees and staff have appropriate access to technological applications to support their learning. The lead should ensure that the technological applications are used appropriately to meet clearly defined curricular, patient and service needs.**
- **Recommendation 2b: Local networks of healthcare, social care and education partners should identify a strategic lead for technology enhanced learning with responsibility for ensuring appropriate use, value for money, equity of access and demonstrable benefits to patients and service.**

Ensuring learning continues to be fit for purpose

2.14. Education, training and ongoing development should keep pace with advances in health and social care delivery to ensure that students, trainees and staff are equipped with the knowledge and skills needed to deliver the best possible care for patients. Just as the practice of healthcare will continue to evolve, approaches to learning need to adapt.

See Case Study: Fig. 5.

2.15. Recognising the importance of empowering individual healthcare providers to make local decisions to meet their education and training needs, it is anticipated that providers will have access to a plurality of information technology providers.[22]

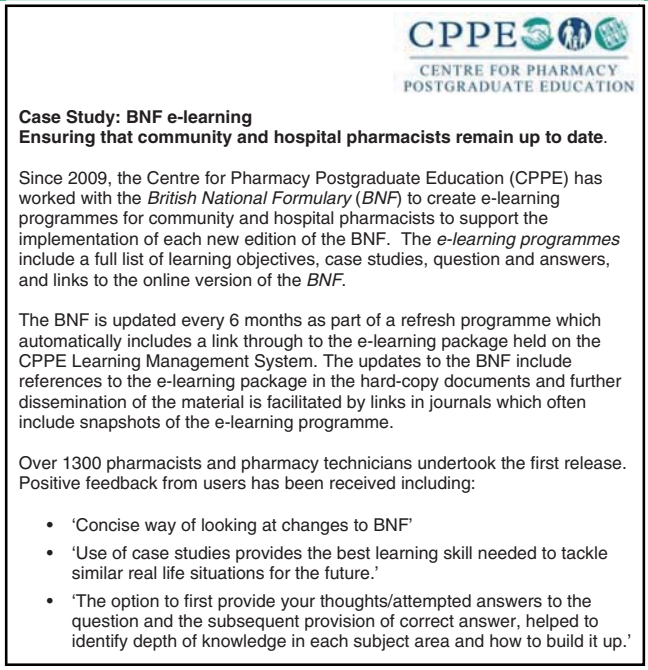


Figure 5

2.16. It is essential that healthcare, social care and education providers regularly review the technology enhanced learning that they are providing to ensure that it remains fit for purpose. This should draw upon advice from patient representatives and include making sure that the learning continues to meet clearly defined current patient and service need, supports the workforce in their specific learning objectives and provides value for money.

2.17. Reviewing learning may be too onerous for individual providers so could be shared across providers working in partnership with each other.

2.18. The frequency of such review should be determined according to the nature and scale of the learning intervention. Reviews should also be carried out whenever significant changes to the educational or service provision occur.

- **Recommendation 3: Those purchasing technological solutions to support learning should undertake regular review to ensure that they continue to meet clearly defined patient and service need, support the health and social care workforce in their specific learning objectives and provide value for money.**

Managing and recording learning

2.19. Healthcare and social care providers need effective and efficient systems to monitor the learning of their employees. These systems enable them to provide evidence for organisations such as the NHS Litigation Authority (NHSLA).

2.20. Learning management systems (LMS) allow users to keep a record of their learning, to capture the results of on-line assessments and provide feedback. Employers can also use a LMS to generate reports describing which members of staff have completed on-line modules and when. This is useful for providing evidence of employee (including both trainees and staff) training. Trainees and staff can use this evidence to meet professional body or regulatory requirement e.g. revalidation. In additions, LMS capture data to enable the evaluation of how on-line resources are being used.

2.21. The DH has invested in centrally developed learning management systems to provide cost-effective solutions for health and social care providers and capture data which providers will be required to share with commissioners and the NHSLA. The National Learning Management System (NLMS) is an integral part of the Electronic Staff Record System (ESR) and enables NHS organisations to blend e-learning with face to face learning. The employee training record is always up to date and will transfer with the employee if they move to a new trust also using the ESR.

2.22. Not all staff groups, however, are covered by the centrally developed learning managements systems. There has been significant variation in approach and many healthcare providers, social care providers and also education providers have purchased or developed their own LMS.

2.23. National platforms will continue to be available and their use for hosting e-learning content and maintaining records of learning is likely to provide financial benefits to health and social care providers when compared to the cost of purchasing and maintaining local systems. If health and social care providers consider, following appraisal, that these systems do not meet their requirements, they may continue to choose to purchase another system.

- **Recommendation 4: Healthcare, social care, and education providers should provide appropriate**

access for all their students, trainees and staff to a system to manage, record and evaluate their learning for example through a learning management system.

B. Educationally coherent (Fig. 6)

2.24. Innovative technologies such as e-learning and simulation have a key role to play in delivering the NHS Constitution commitment and staff pledge to, "Provide all staff with personal development, access to appropriate training for their jobs, and line management support to succeed." To realise this pledge healthcare and social care providers need to work in partnership with education providers and draw on the leadership of professional organisations such as regulators and royal colleges.

2.25. There is a risk that technological applications are not currently being used to maximum effect and may be inappropriately or under-utilised. Curricula or similar learning frameworks can play an important role in promoting the use of innovative technologies. In addition to describing the learning outcomes, syllabi and assessments, curricula or similar learning frameworks should describe how technological applications can support the development of knowledge and skills that underpin each learning outcome. This should also provide an opportunity to describe the role innovative technologies can play in supporting multidisciplinary and interprofessional learning.

2.26. To ensure that curricula or similar learning frameworks promote good practice, organisations responsible for curriculum development should identify a lead.

2.27. Where regulators provide guidance about the mode of learning, this should include references to their expectations about the role technology should play in supporting learning. The learning opportunities that are provided through technology should be quality assured.

2.28. Clearly describing the potential of role of simulation, e-learning and other technologies in delivering specific learning outcomes will enable those responsible for the delivery of training to identify the resources needed.

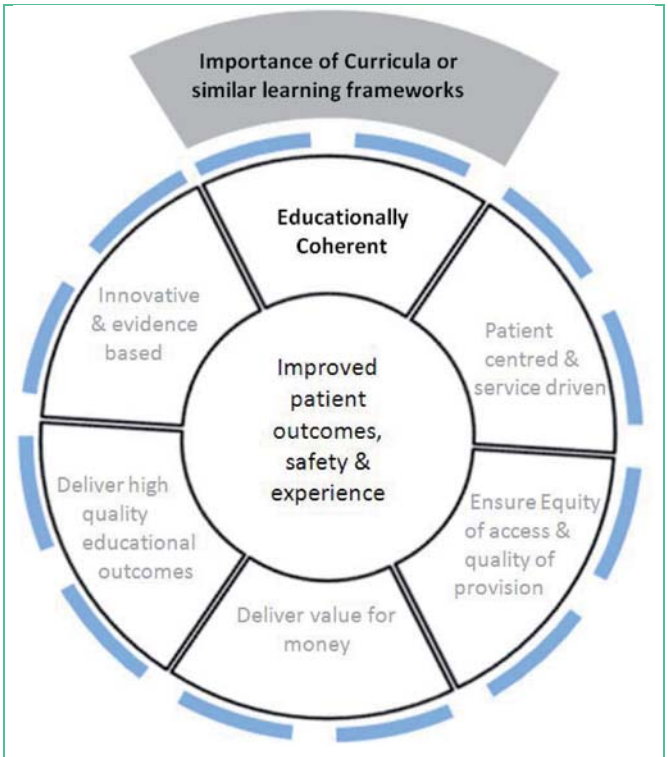


Figure 6

- **Recommendation 5a: Organisations involved in developing curricula or similar learning frameworks should identify a strategic lead for technology enhanced learning.**
- **Recommendation 5b: Those responsible for developing curricula or similar learning frameworks should recommend what role simulation, e-learning or other technologies should play to support learning and assessment. They should highlight and describe the opportunities for the use of technology. They should indicate how to facilitate multidisciplinary and interprofessional learning in the delivery of their curricula or similar learning framework outcomes.**
- **Recommendation 5c: The use of simulation, e-learning and other technologies should be achievable and clearly mapped to specific learning outcomes in identified areas of the curriculum or learning framework.**
- **Recommendation 5d: Simulation, e-learning and new technologies should not be used as an end in themselves, but appropriately integrated in a blended approach to learning and implemented to address specific learning or clinical needs.**

C. Innovative and evidence-based (Fig. 7)

2.29. Research evidence suggests that e-learning and simulation, when compared to traditional approaches to training, can at least deliver an equivalent improvement in knowledge and skills. There is, however, less evidence examining changes and improvement in performance in the workplace. While satisfaction, improvement in knowledge and change in behaviour are important metrics for evaluation, the choice of learning approach should also be informed by the impact on quality of care, workforce performance, patient outcomes, safety and experience. This will also require evaluation of cost effectiveness.

2.30. The Department of Health through the National Institute of Health Research (NIHR) is committed to the evaluation of education and training including the role of technology. NIHR has already funded a number of research projects evaluating the role of innovative technologies to support education, training and personal development for the benefit of patient care.

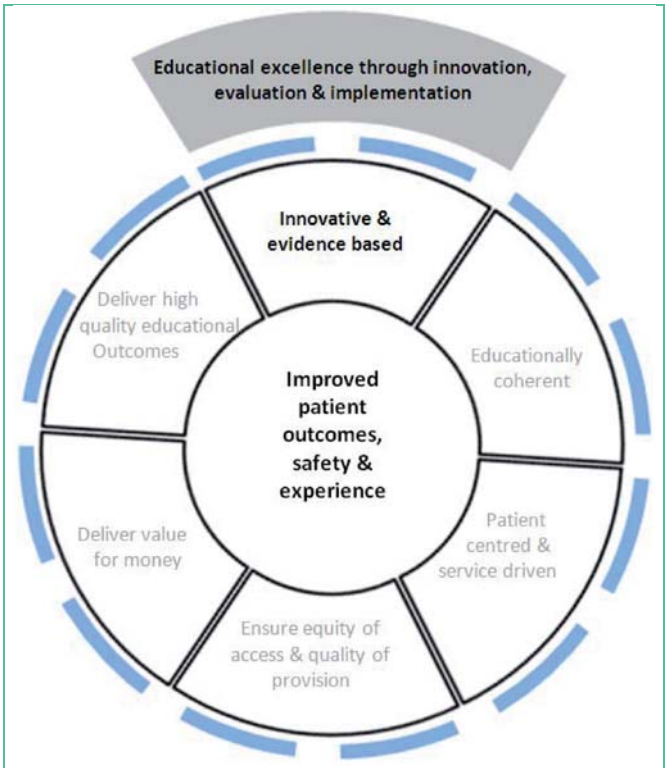


Figure 7

Case Study – Operating Theatre Induction for the Novice[23]

One of the randomised controlled trials supported by the National Institute for Health Research (NIHR) Comprehensive Biomedical Research Centre at Imperial College London and Imperial College Healthcare NHS Trust, evaluated four different approaches to training students and staff, who had no previous experience of working in an operating theatre (novices).

60 operating theatre novices were randomised into four equally sized groups: control group, didactic lecture group, an online Second Life™ Operating Theatre group (Fig. 8) and a Simulated Operating Suite group (Fig. 9).

The study found that the Lecture, Second Life™ and Simulated Operating Suite groups demonstrated a significant improvement in all measured outcomes. These three groups had significantly higher observed behaviour scores, self report scores, and knowledge scores as assessed through multiple-choice questionnaires compared to the Control group

This study demonstrated the value in delivering an induction training programme for students and staff, who have not previously worked in an operating theatre. While it is recognised that the Simulated Operating Suite is the optimal environment for novice training, access to a Simulated Operating Suite is limited. In the absence of such a training facility, a Second Life™ Virtual Operating Theatre is an appropriate alternative to educate the novice.

Figure 8 Demonstrating the Second Life™ Virtual Operating Theatre

2.31. Further research is needed and healthcare providers, social care providers and education providers should play a key role in this. This research should be underpinned by defined outcome measures to capture the value of technologies in improving

Figure 9 Displaying the Simulated Operating Theatre

performance and patient outcomes through improving knowledge, skills and attitudes.

- **Recommendation 6: Healthcare, social care and education partners should aspire to educational excellence by encouraging innovation, evaluation (including benefits realisation) and the dissemination and adoption of evidence-based, good practice.**

D. Deliver high quality educational outcomes (Fig. 10)

2.32. Simulation, e-learning and other technologies have the potential to improve not only the quality of health and social care services but also patient outcomes, safety and experience. The decisions of healthcare, social care and education providers to use technological applications to support learning should be based on a clear understanding of the needs of learners and as noted earlier informed by the best available evidence. Providers of health and social care education and training need to be assured of the quality of the proposed technologies, including the facilities, the equipment and content, and will need to invest in faculty development.

Enabling informed judgements

2.33. While developers of facilities, equipment and content typically provide details of their products' technical qualities, they should also provide evidence to demonstrate educational quality. It is essential that there is a clear statement of the purpose for the facilities, equipment or content, which includes the intended users and the expected learning outcomes. Guidance on the use of facilities, equipment or content should also be provided. In addition, details of any outcome evaluation should be included.

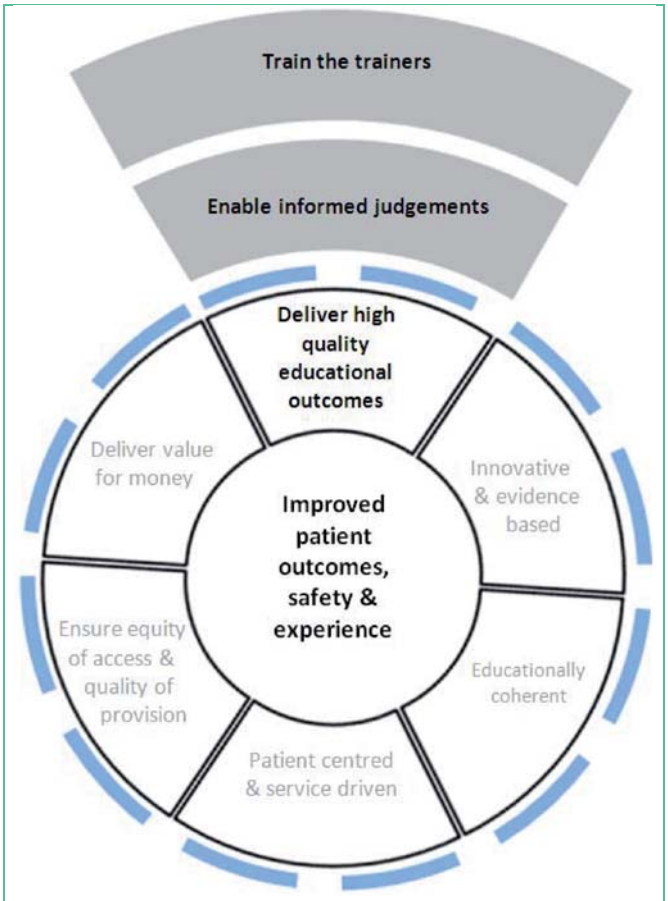


Figure 10

2.34. The developers of content, including e-learning content, and simulation scenarios should describe who has checked or approved it, the development date and when it should be reviewed. Where content has been developed in conjunction with educational organisations, this should be supported by an endorsement from the appropriate body (e.g. the college or university). Any content for professional and mandatory training should be capable of demonstrating that they reflect current best clinical and educational practice and, where applicable, meet the relevant regulator's standards.

2.35. Learners and those involved in education and training should be involved in purchasing decisions.

- **Recommendation 7: There should be a clear statement of the purpose of the facility, equipment or content identifying the target group(s), expected learning outcomes and where appropriate guidance on its use.**

Training the trainers

2.36. The use of technology to support learning requires additional skills. While all educators and trainers need the necessary pedagogical skills, those working in a simulation environment may need to develop skills in developing scenarios, programming the computer systems, editing the video feed and debriefing. Users of e-portfolio and e-learning content may need additional IT training to fully utilise these resources.

- **Recommendation 8: Healthcare, social care and education providers should ensure that educators and trainers are competent to use the required simulation facilities or equipment, e-learning and any other technological tools.**

E. Deliver value for money (Fig. 11)

2.37. The DH's Quality, Innovation, Productivity and Prevention (QIPP) agenda challenges the NHS to use innovation to make radical improvements to quality, efficiency and productivity, while delivering savings for re-investment in frontline patient care. Therefore, decisions about the adoption of new technologies to support learning should consider whether they will improve productivity and whether they are affordable and cost effective. One way to ensure value for money is to maximise opportunities for collaborative working, both across providers and disciplines or professions. This should reduce duplication.

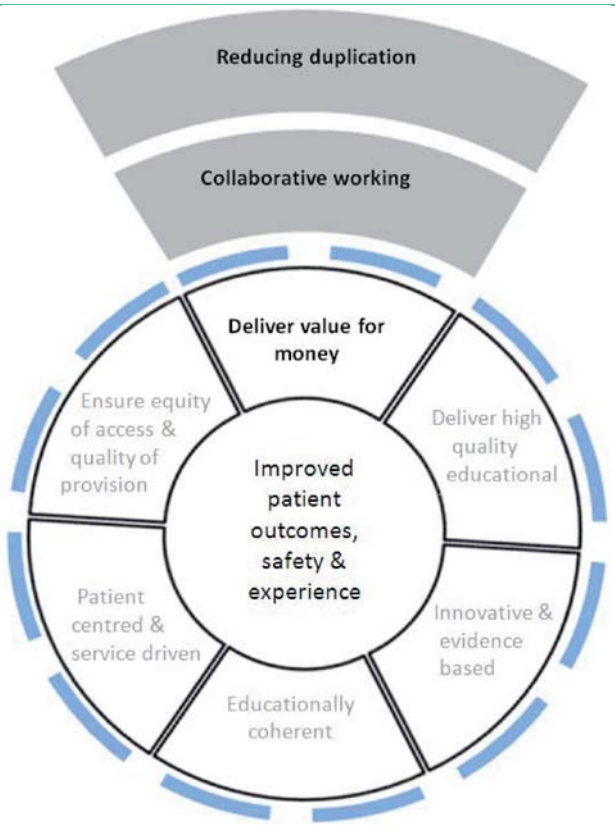


Figure 11

Case Study – the e-Learning for Healthcare "Safeguarding Children and Young People" Project as implemented by Imperial College Trust

All NHS Trusts have a statutory duty to train their staff in safeguarding children and young people; a matter that has proved difficult to deliver with purely traditional training methods. During 2008, Imperial College Trust had trained only 10% of its workforce (approximately 10,000 people across 5 sites), focusing mainly on frontline paediatric staff. By April 2010, 100% of the workforce had been trained following the creation of one 40 minute e-learning by e-LfH in conjunction with the Department of Children and Families (DCSF), the Royal College of Paediatrics and Child Heath (RCPCH) and the National Learning Management System (NLMS).

By early 2010 the Safeguarding arrangements at the Trust were reviewed by the NHS London Safeguarding inspection team and received 'commendation for exemplary processes in place'. Implementation at the Trust also delivered direct and opportunity cost savings of £355K per annum, plus efficiency gains in easier rostering and releasing staff time back into front line clinical care. In addition, benchmarking the first 1800 users showed that the Trust saved 1.06 tonnes of CO_2 between Sept 2009 and Dec 2009, equating to an annual saving of 5.78 tonnes/year.

Figure 12

Collaborative working

2.38. Collaborative working has the potential to deliver value for money in the provision of simulation training, e-learning and other technological methods. This may involve sharing simulation facilities and joint development, commissioning of facilities, equipment, technical expertise, and e-learning content.

2.39. In particular, the use of nationally developed e-learning content for nationally accepted curricula and for statutory and mandatory training is likely to be cost effective. Where this does not fully meet the requirement of healthcare, social care and education providers, there can be significant benefit in collaborative working to ensure that the needs of those providing health and social care along the entire integrated patient pathway are met.

- **Recommendation 9: Healthcare, social care and education providers should work collaboratively to share resources, to maximise their purchasing power and increase opportunities for multidisciplinary and inter-professional training across the entire care pathway.**

Reducing duplication

2.40. In order to ensure that local providers do not purchase or develop content where suitable material already exists, sharing should be actively encouraged. There should continue to be a central register of e-learning content and this should be extended to include simulation scenarios. Wider use or adaptation of existing content has the potential to reduce duplication and cost.

- **Recommendation 10a: A national register covering e-learning modules, simulation scenarios and toolkits should be maintained to provide the facility to search for existing tools or projects in development.**
- **Recommendation 10b: Healthcare, social care and education providers, either individually or working together, should search the register before developing or procuring any new technologies to support learning to reduce duplication and ensure value for money.**

Case Study – the e-Learning Portal

The e-Learning Portal has been developed to provide a single portal to provide information about national e-learning projects within the NHS.

This includes the e-learning repository which is designed to provide information about existing e-learning content as well as providing a platform for sharing e-learning resources.

There is also an e-learning readiness toolkit to help plan e-learning delivery. It was developed by Connecting for Health with input from Skills for Health and provides a bank of resources and guidance on best practice, it also includes a tool to help organisations judge how ready they are to implement e-learning resources.

The e-learning portal uses a SharePoint Network as an e-learning Developers Network to allow developers across the NHS to share information with each other and also has its own Twitter account to enable anyone to keep up to date with developments.

Links are also available to the National Learning Management System and the resources provided by the various national suppliers.

Figure 13

F. Ensure equity of access and quality of provision (Fig. 14)

2.41. The NHS Constitution and staff pledge applies to the entire workforce and all members of the health and social care team should have access to appropriate training for their jobs, and line management support to succeed.

2.42. High quality patient care relies on staff working effectively together. Therefore, healthcare, social care and education providers should demonstrate equity of access and provision across all relevant student, trainee and staff groups. The quality of education, training and development should not differ according to factors such as geography.

Increasing the availability of e-learning content

2.43. The availability of e-learning content will be enhanced if it is developed according to agreed technical standards so it can be made available to a wide audience even if the provider is not using a national platform or learning management system. SCORM (Sharable Content Object Reference Model)

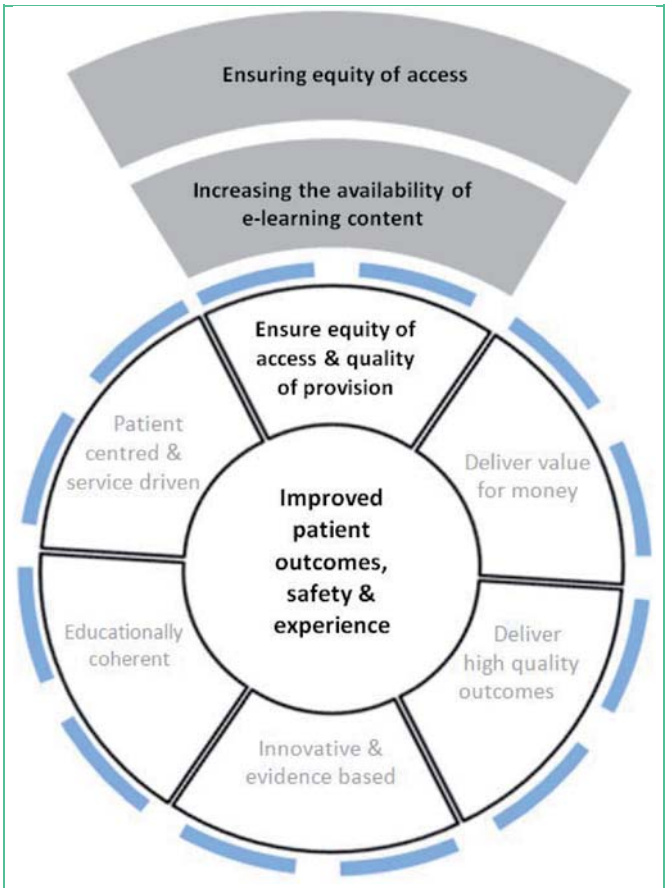


Figure 14

compliance is typically used as a standard in the development of e-learning material.

2.44. National platforms will continue to be available and their use for hosting e-learning content and maintaining records of learning is likely to provide financial benefits to health care providers when compared to the cost of purchasing and maintaining local systems. Healthcare and social care providers, however, may choose to purchase another system.

- **Recommendation 11: Content to support e-learning on computers or mobile devices should be developed according to agreed technical standards to ensure easy access across different learning management systems.**

Ensuring equity of access

2.45. As part of the NHS's commitment to widening participation and the provision of access to appropriate training for their staff, it is essential that all providers monitor and take active steps to ensure equity of access to appropriate technology enhanced learning.

2.46. In line with the 2010 Equalities Act it is important that technology enhanced learning resources are designed and procured with accessibility in mind.

- **Recommendation 12: Healthcare, social care and education providers should ensure that they can demonstrate equity of access and quality of provision through effective local educational governance mechanisms considering feedback from students, trainees and staff, and to the satisfaction of the relevant professional regulator, where applicable.**

3. Conclusion and next steps

3.1. To improve patient safety, experience and outcomes through world-class education, the health and social care sector should continue to invest in technology to support learning as part of a managed learning process. This also has the potential to deliver better value education, training and workforce development.

3.2. This framework has been developed in conjunction with a wide range of partners. We have listened to employers, regulators, education providers and the health and social care workforce. It sets out recommendations to support good practice.

3.3. As a framework, it does not dictate to providers how they should use technology for the delivery of education and training nor does it establish central programmes to use technology to enhance learning. It does not mandate the use of material and systems from those central programmes that are already in operation. However, this framework establishes key principles for the appropriate use and provision of technology to support learning. It highlights the benefits of co-operation and collaboration, and identifies national resources (such as e-Learning for Healthcare and the National Learning Management System) that are available and can deliver solutions that are more likely to be cost effective than fragmented local provision.

Appendix A

Technology Enhanced Learning Project Board – membership

(At time of production)

- Patricia Hamilton, *Senior Responsible Owner* (Director of Medical Education, DH)
- Mary Armitage (Senior Clinical Advisor, Medical Education and Training Programme, DH)
- Andy Ashworth, *Programme Manager* (Education and Training Programme Manager, DH)
- Alex Bailey, *Clinical Advisor* (Medical Directorate, DH)
- Stuart Carney, *Chair of the Framework Development Group and Clinical Lead* (Chief Medical Officer representative, DH)
- Mark Dexter (Regulator representative, GMC)
- Debbie Mellor (Deputy Director, Workforce Education, DH)
- Elaine Plumb, *Secretariat* (Workforce Education Policy Executive Officer, DH)
- Damian Roland (Trainee representative, Academy of Medical Royal Colleges)
- Christine Whitehead (SHA representative, NHS South West)

Appendix B

Framework Development Group membership

(At time of production)

- Stuart Carney, *Chair* (Chief Medical Officer representative, DH)

- Andy Ashworth, *Programme Manager* (Workforce Education Policy, DH)
- Alex Bailey, *Clinical Advisor* (Medical Directorate, DH)
- Bryn Baxendale (ASPiH)
- Professor Philip Cachia (NHS Education for Scotland)
- Tricia Ellis (SHA e-Learning lead representative)
- Mike Farrell (NHS North West)
- Elizabeth Hughes (COPMeD representative)
- Lisa Hughes (Allied Health Professions Officer, DH)
- Sally Malin (Lay representative)
- Joe McArdle (NHS North West)
- Julia Moore/Alan Ryan (e-Learning for Healthcare)
- Debbie Mellor (Workforce Education Policy, DH)
- Professor Anne Peat (HEI representative)
- Elaine Plumb, *Secretariat* (Workforce Education Policy, DH)
- Professor John Purvis (Professor of Pharmacy Education, Bradford University)
- Jerry Read (Dental and Eye Care Services, DH)
- Pat Saunders (Chief Scientific Officer, DH)
- Maire Smith (Training for Innovation)
- Caroline Waterfield (NHS Employers)
- Chris Whitehead (NHS South West)
- Su Wilkinson (Connecting for Health)

The Framework Development Group is indebted to the following for providing additional content and extensive feedback:

- Ian Curran (London Deanery)
- Professor Mary Lovegrove (Council of Deans of Health)
- Pramod Luthra (North Western Postgraduate Deanery)

Glossary

A

Accreditation: The process of approving that a learning process or programme meets certain published standards.

Asynchronous e-learning: E-learning that can be completed by an individual without being part of a group and at different times in different places.

Avatar: A graphical representation of a computer or a system user in a three-dimensional representation in a virtual world (in the case of the usage within the context of this report)

B

Blended learning: The process of mixing different environments or approaches to support learning. This typically includes e-learning and some form of face to face interaction.

C

Certification: The process of approving that an individual meets certain published standards.

Clinical skill: A task or intervention undertaken by a member of the healthcare team. Clinical skills trainers (see task trainers).

Contextualised simulation: Rather than simply using a simulator on a bench-top in isolation, contextualised techniques employs a range of simple aids that greatly enhance the realism of a simulator to a learner. These can include using actors to add a 'human' dimension to the task, such as the need to formally consent and discuss options prior to performing the task.

D

Debriefing: A post performance evaluation of team performance often using audio-visual playback that creates opportunities for participants to identify strengths, weaknesses and systems or process-based issues through facilitated feedback. To be effective debriefing needs to be supportive but challenging.

Distributed simulation: A unique approach of creating simulations, focusing upon identifying minimal but essential components of a task or environment, the simulation only contains these key components. This simulation technique affords considerable cost savings by focusing upon the simulation being 'real enough' rather than providing high fidelity experiences across all elements.

E

E-learning: The computer and typically network-enabled transfer of knowledge and skills. This includes but is not confined to the use of desktop computers, laptop computers and mobile devices to facilitate and support learning.

E-learning repository: In this document, refers to the NHS e-learning repository (which is now part of the NHS e-learning portal) and provides a "search and discover platform" to encourage the sharing of e-learning objects and learning resources.

E-portfolio: An electronic portfolio is a web-based application for the planning, management and collection of evidence about achievements, experiences and reflections.

ESR (Electronic Staff Record): A Department of Health led initiative providing an integrated Human Resources and Payroll system across the majority of the NHS.

Experiential learning: The process of deriving meaning from direct experience.

F

Fidelity: The physical, contextual, and emotional realism that allows persons to engage with an experience or simulation. It allows participants to behave 'as if' they were operating in an actual healthcare activity or environment.

Formative evaluation: A process for determining the competence of a person engaged in a healthcare activity for the purpose of providing constructive feedback for that person to improve.

G

Guideline: A document recommending the qualities needed for simulation fidelity, simulation validity, simulation program, or for formative or summative evaluation.

H

Haptic: Refers to all the physical sensors that provide a sense of touch at the skin level and force feedback information from muscles and joints.

Health and social care workforce: Is used to throughout the document to describe 'health and social care students, trainees and staff.'

Human factors: The discipline or science of studying the interaction between human beings, systems and technology. The term covers all biomedical and psychological considerations of human interactions in a process from system and physical design, to operational implementation and functional issues such as ergonomics and the human responsiveness of a process.

Hybrid simulation: Combination of different simulation modalities such as simulated patients and past-task trainers to enhance the realism of educational activities.

I

Interprofessional: Interprofessional education occurs when two or more professions learn with, from and about each other to improve collaboration and the quality of care (adapted from: Centre for the Advancement of Interprofessional Education, 2002).

Immersive environment: An immersive digital environment is an artificial, interactive, computer-created scene or "world" within which a user can immerse themselves i.e. Second Life.

Insitu-simulation: The placement of a patient simulator, simulated patient or part task trainer into a real clinical environment for the purpose of training.

L

Learning management system: This is a software application for administrating, documenting, tracking and gathering other data about training programmes including e-learning.

Learning outcome: Sets out what a learner is expected to be able to do as a consequence of the learning process.

M

Mobile simulation: A technique where simulators or simulation training is performed in a mobile or dynamic environment such as an ambulance or hospital corridor. An example would be simulation training to prepare medical or ambulance staff to perform the transfer of critically ill simulated patients (using a mannequin) within or between hospitals. The transfer of critically ill patients is potentially a high risk endeavour as the individuals involved need to develop an even higher sense of vigilance and preparedness for a wide range of challenges and eventualities. Whilst in an isolated location such as an ambulance they are away from immediate advanced support.

Mobile technologies: Refers to the use of highly mobile technologies utilising applications (or "apps") built for example, for mobile phones and tablet computers.

Multidiscipinary: Students from different workforce groups learning together.

Manikin (mannequin): Full or partial body representation of a patient for practice.

N

Non-technical skills: Typically used to refer to communication and teamwork skills.

P

Patient centred: Focussed on the needs of patients.

Q

QIPP: Quality, Innovation, Productivity and Prevention agenda.

S

SCORM (Sharable Content Object Reference Model): A collection of standards and specifications for web-based e-learning.

Simulator: A setting, device, computer program, or system that recreates essential elements and cues; to encourage experiential learning related to particular educational objectives.

Simulation: A technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions.

Simulation program: A formal workshop, course, class, or other activity that uses simulation as a substantial component of the educational technique.

Scenario: A scripted context or initial set of conditions including background history, and any subsequent interventions or developments over a defined time line. These scheduled or significant events are used to replicate or recreate dynamic and evolving clinical situations in order to achieve the intended learning objectives.

Summative evaluation: A formal often high stakes assessment process used to determine the competence or proficiency of a person engaged in a defined healthcare activity. Summative assessment is often associated with certification or credentialing processes and used to validate performance or career progression.

Standard: A statement defining the minimum requirements of an activity or process often as part of a quality control or assurance process.

Standardised patients: A standardised patient provides a scripted, consistent clinical encounter, this will include the relevant history, body language, physical findings, and any required emotional or personality characteristics of the real life patient. A standardised patient can be a real patient or an actor they are often carefully selected and coached to simulate a particular history or clinical condition. The training emphasises the need for a consistent performance from the standardised patient. This allows repeated reruns of the same clinical encounter usually a clinical consultation so that multiple learners can be exposed to a standardised clinical experience. The aim of standardised patient simulations is to make the encounter as reproducible and authentic as possible, ideally the level of engagement with the clinician is such that the simulation cannot be detected by a skilled clinician. Standardised patients are often used in high stakes examinations and can be used or in advanced communication training.

Synchronous e-learning: E-learning that takes place where participants engage with the learning material at the same time (and usually overseen by a facilitator).

T

Task trainer: A simulator designed to practice a specific set or cluster of clinical skills.

Technical skills: The actual performance of practical procedures or tasks directly affecting patient care. Examples include: cannulation (siting an intravenous drip) suturing or performing investigations such as performing an ECG (electrocardiogram).

V

Validity: The quality of a simulation or simulation program that demonstrates that the relationship between the process and its intended purpose is specific, sensitive, reliable, and reproducible.

Virtual reality: A term that applies to computer simulated environments that can simulate the physical presence in places in the real world as well as in imaginary worlds.

Virtual world: A computer-based simulated environment through which users can interact with one another and use and create objects.

W

WAPPIG: The Workforce Availability Policy and Programme Implementation Group - the body consisting of representation from the Department of Health and Strategic Health Authorities responsible for commissioning this work.

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