

**A Proposal for the Modernisation of the Undergraduate Curriculum
To Enhance the Digital Medical Workforce**

For the Faculty of Medicine and the University of Southampton

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Short Summary

This discussion paper addresses the requirement to modernise of the Undergraduate Curriculum in Medicine to enhance the digital competencies of the healthcare workforce.

I set out the case for modernisation by introducing an additional component to the annual education modules to be developed, tested and iterated by whatever appropriate means.

I do not underestimate the work and cultural shift that will be involved in this project. However, an agile methodology will substantially de-risk the project in its early phases.

Introduction

Excellence in clinical record keeping and health information exchange are central to medical practice and hence to medical education.

The past two decades have heralded a radical and irreversible shift from paper to digital systems. “Digital” is transformational in many ways. However, it also brings wholly new ways and challenges to working and thinking which have not yet been fully grasped across the health professions.

Digital Transformation remains particularly immature at the human user interface across healthcare. This immaturity of digital systems has huge consequences for professional productivity and work satisfaction, and for the training, long term motivation and retention of all health professionals in primary, secondary and social care.

At present, we continue to educate medical students in traditional analogue ways of clinical working, through clerking, note keeping and clinical decision making.

There is no formal education on the structures, complexity and limitations of the digital systems into which they are thrown on graduation.

Ownership of the digital transformation programme has largely been “contracted out” by the healthcare professions to IT and management professionals across the supply chain.

In general terms, digital systems are broadly imposed from above upon the healthcare workforce with little robust end user evaluation, creating a “Digital by Diktat” imperative to grudging use, rather than a “Digital by Default” pull through design and implementation excellence

If the next generation of health professionals is to optimise the productivity, the efficiency and the effectiveness of digitised clinical services, then we need to equip them now with the skills and insights to shape their personal and collective digital futures.

Health Education England and the “Digital Workforce”

Health Education England has set out a broad ambition to “Build a digital ready workforce”, but the aspiration is light on detail as to implementation.

The HEE “Health and Care Digital Capabilities Framework” sets out a number of principles to be developed in the workforce. These include the abilities:

- a. To find, manage, organise, store and share digital information, data and content
- b. To understand and act upon appropriate guidelines, protocols, regulations and safeguards in the use of differing media, information, data and content to meet legal, ethical, cultural and security rules, requirements and expectations when working with personal, public, professional and/or confidential information, data and content
- c. To critically analyse, evaluate and/or interpret information, data, content and their sources
- d. To understand and adhere to digital copyright, intellectual property and privacy rules and regulations
- e. To work with and champion the effective, secure, appropriate and innovative use of information, data and content in order to solve problems, make decisions and to achieve successful outcomes for specific goals and objectives.

The Influence of the UK Government Digital Service (GDS)

All staff, students and citizens are now familiar with advanced user experiences within commercial IT systems, as exemplified within mobile phones and social media interfaces.

However, the user experience of many workplace systems and interfaces across the public sector, NHS and University remains unsatisfactory, with poor usability design leading to professional frustration and loss of productivity.

The GDS has played a major role in developing thinking about digital processes and systems in the UK public sector over the past decade, through a root and branch reform of the way that digital systems are built and implemented from the ground up.

The health professions have much to learn from this approach, which includes:

- Robust and exhaustive user experience research and discovery
- Fast implementation through Agile, Sprint and “Fail Early, Fail Fast” Methodologies
- In house ownership and development of major systems
- Elimination of Waterfall (top down specification) methodologies
- Digital by Default Design to secure compelling user experience and system uptake.

Education of the academic and clinical workforces in the principles of digital systems design, development and implementation will help:

- to raise expectations and standards of system performance for end users
- to inform debate across the spectrum of digital transformation in the workplace
- to increase the pool of clinical professionals across the digital development landscape.

The General Medical Council and Digital Education

The GMC has a pivotal role in defining the medical educational curriculum. Thus, any developments in digital healthcare systems education must take into account

In an article on 9th May 2019 in the New Statesman, James Hadlow, Chris Farmer and Chris Holland asked “How education could lead to a new era of digital healthcare”. This paper is a good starting point for further exploration of an updated Curriculum for Southampton.

See <https://tech.newstatesman.com/guest-opinion/education-digital-healthcare>

They stated:

“A modern healthcare system needs a modern training system. Yet, despite lessons in coding being introduced to primary schools in 2014, the medical training system lags far behind our primary school counterparts....In an already packed curriculum, it is difficult to immediately see where a considerable syllabus for understanding technology data and ethical artificial intelligence could fit”.

“... the words “artificial intelligence” and “digital health” do not appear as part of the GMC guidance for medical curricula for UK doctors, although the GMC does specify (PDF) more broadly that doctors should be able to “make effective use of decision making and diagnostic technologies”. Given their increasing ubiquity, the use of digital healthcare tools should be more explicit.

The term “education in digital health” is vague and the scope of the training required is a matter of discussion. It’s unrealistic to expect all doctors to be able to code but should digital health expertise be a specialist interest or is it a core skillset that should be required of future doctors? Is it now time for an undergraduate curriculum to be written? Indeed, there is a precedent for this work as evidenced by the Faculty of Medical Leadership and Management (PDF) who have developed an agenda for a similar “non-traditional clinical” curriculum....

... The Kent and Medway Medical School, is developing nine vertical themes which ... focus on nine contemporary and innovative areas in which the NHS workforce must increasingly develop expertise. Each vertical theme has a champion who will ensure that the theme is represented throughout their programme, including champion for “health innovation in the 21st century”.

... We perhaps need to start seeing technology as part of the solution of an under-resourced workforce. Opponents to digital health rightly point out other priorities in healthcare such as understaffing and poor working conditions. It is important therefore to ensure the message regarding digital health is clear: that digital health can help, not by replacing staff, but by facilitating productivity in other areas which allows staff to concentrate on those areas which absolutely require human interaction”.

Generic user skills for personal and University digital systems are NOT the focus of this proposal.

The Purpose and Content of a digitally Enhanced Medical Undergraduate Curriculum

The digital world is in a state of rapid and continuous evolution at a pace, scale and scope which is previously unknown to mankind. This year's innovations are yesterday's memories in the five year scope of a medical undergraduate education.

Therefore, any educational package must focus upon core principles of general application in the digital workplace, rather than upon the formulaic study of particular digital systems.

The purpose of this proposal is to equip the future medical workforce with the knowledge and insights to specify and articulate user needs and routes to implementation in a wide range of clinical systems and applications.

This knowledge will be applied in the context of a workplace which is rapidly moving to greater connectivity, inter-operability, open standard systems and cloud based resources.

The proposal is explicitly NOT about teaching coding skills, as these skills are perishable with changing software systems.

It is about equipping students with the skills and knowledge of software methodologies, tools and processes to enable them to interact more effectively and confidently with software professionals in the design, implementation and optimisation of digital systems everywhere in the healthcare universe.

The principles to be taught (in no order of preference) may include those:

- Of user centric IT system design, including Methods for User Research; Agile and iterative development processes; and the natural life cycle of software systems
- Of end user optimisation, data visualisation and system integration
- Of the benefits and limitations of Digital Transformation
- Of Digital Teamwork and Digital Change Management
- Of coding for digital health systems

- Of infrastructure design and service provision, including cloud services
- Of citizen- and patient-centric IT systems
- Of design for digital security

The course teaching may also include:

- Awareness of the landscape of commercial and bespoke healthcare systems and providers
- An Introduction to careers in Digital Healthcare systems and management
- The role of bioinformatics in healthcare
- An awareness of Health Data Systems and Big Health Data
- The application of Predictive Analytics and Artificial Intelligence to Healthcare Data
- Technology Horizon Scanning and the management of rapid digital technology change

The Unique Opportunities for Digital Curriculum Development in Southampton

An undergraduate medical education in Southampton integrates core education through the Faculties of Medicine and Health Sciences at the University; high level clinical education at University Hospital Southampton (UHS) and its affiliated regional hospitals; and community wide education in primary care and other health facilities.

Any solution to the “digital curriculum” must take into account the resources and requirements of all streams of educational provision. In terms of the available expertise:

- UHS is one of the most forward thinking digital exemplar hospitals in the UK. In particular, it has a unique and advanced digital infrastructure which permits agile development, experimentation and innovation to a far greater degree than is achievable in the many NHS hospitals which have bought into the large and less developmentally agile commercial software systems from suppliers such as Epic, Cerner, Allscripts and Microsoft.
- UHS also has a cohort of motivated and experienced NHS clinicians and IT specialists with considerable collective local expertise in IT systems design and development.
- The University Faculties of Medicine and Health Sciences have a strong history and corporate experience of innovation in the undergraduate curriculum.
- The University Faculties of Computing and of Engineering have resources in depth in digital teaching and systems development

- The University Web Science Institute, which has broad based expertise in the design and evaluation of networked systems and their social and educational impact.

The Design Principles for a digitally Enhanced Medical Curriculum

The case for a solution to this challenge is compelling. Given the uncertainties around content, delivery and impact upon the current curriculum and upon the various student cohorts, an agile, gradualist, multi-year and digitally delivered programme module commends itself for further experimentation.

The general design principles for any workable solution are that:

- The course should span all year groups, from Year 1 to Year 5
- It should be least disruptive to the current curriculum
- It should be developed and implemented at least cost, consistent with a high quality of content, presentation and delivery of the course material
- It should be testable and evaluable
- It should be consistent and sustainable
- Once developed, it should make least demand in delivery and maintenance upon teaching , technical and support staff
- it should be collaborative in development and execution
- It should be exportable, both to other Faculties and to other organisations
- It should support distance learning, and commoditisation for other target audiences, such as for partner institutions in developing countries.

A Possible Solution

The Virtual Learning Environments of Blackboard (UoS) and the UHS Staff VLE offer a possible template for the design, development, delivery, testing and audit of a digital education module which can be progressively implemented alongside or within the UoS FoM curriculum.

An on line digital learning environment permits:

- The offline and incremental development of course content
- Consistent delivery of content

- regular updating of content
- Universal access of content to all target audiences for use at a time and in a place of their choosing within a given time period.
- In line testing
- In line audit of usage and the auto-generation of data for iterative development.

Steps to implementation

This is a complex project which requires clear sighted and effective leadership and multi-stakeholder engagement.

The content and the intent will be outwith the immediate experience and comfort zone of key decision makers, who will need to agree:

- a designated development team
- sufficient resources of time and technical support at each stage of the programme.

A phased and agile in house programme would substantially de-risk the delivery of the project financially, practically and “politically” (eg GMC), and it can be implemented as a voluntary educational “extra” even if not fully implemented within the curriculum.

A well designed, modular and innovative course on such content is likely to secure the approval and engagement of a student body which now need the intellectual tools to progress lives and careers in the many complex and as yet immature digital worlds beyond medical graduation.

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