

Critical thinking in healthcare and education

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Imagine you are a primary care doctor. A patient comes into your office with acute, atypical chest pain. Immediately you consider the patient's sex and age, and you begin to think about what questions to ask and what diagnoses and diagnostic tests to consider. You will also need to think about what treatments to consider and how to communicate with the patient and potentially with the patient's family and other healthcare providers. Some of what you do will be done reflexively, with little explicit thought, but caring for most patients also requires you to think critically about what you are going to do.

Critical thinking, the ability to think clearly and rationally about what to do or what to believe, is essential for the practice of medicine. Few doctors are likely to argue with this. Yet, until recently, the UK regulator the General Medical Council and similar bodies in North America did not mention "critical thinking" anywhere in their standards for licensing and accreditation,¹ and critical thinking is not explicitly taught or assessed in most education programmes for health professionals.²

Moreover, although more than 2800 articles indexed by PubMed have "critical thinking" in the title or abstract, most are about nursing. We argue that it is important for clinicians and patients to learn to think critically and that the teaching and learning of these skills should be considered explicitly. Given the shared interest in critical thinking with broader education, we also highlight why healthcare and education professionals and researchers need to work together to enable people to think critically about the health choices they make throughout life.

Essential skills for doctors and patients

Critical thinking is not a new concept in education: at the beginning of the last century the US educational reformer John Dewey identified the need to help students "to think well."³

Critical thinking encompasses a broad set of skills and dispositions, including cognitive skills (such as analysis, inference, and self regulation); approaches to specific questions or problems (orderliness, diligence, and reasonableness); and approaches to life in general (inquisitiveness, concern with being well informed, and open mindedness).⁴

An increasing body of evidence highlights that developing critical thinking skills can benefit academic outcomes as well as wider reasoning and problem solving capabilities.⁵ For example, the Thinking, Doing, Talking Science programme trains teachers in a repertoire of strategies that encourage pupils to use critical thinking skills in primary school science lessons.

An independently conducted randomised trial of this approach found that it had a positive impact on pupils' science attainment, with signs that it was particularly beneficial for pupils from poorer families.⁶

In medicine, increasing attention has been paid to "critical appraisal" in the past 40 years. Critical appraisal is a subset of critical thinking that focuses on how to use research evidence to inform health decisions.⁷⁻⁹

The need for critical appraisal in medicine was recognised at least 75 years ago,¹⁰ and critical appraisal has been recognised for some decades as an essential competency for healthcare professionals.¹¹ The General Medical Council's *Good Medical Practice* guidance includes the need for doctors to be able to "provide effective treatments based on the best available evidence."¹²

If patients and the public are to make well informed health choices, they must also be able to assess the reliability of health claims and information. This is something that most people struggle to do, and it is becoming increasingly important because patients are taking on a bigger role in managing their health and making healthcare decisions,¹³ while needing to cope with more and more health information, much of which is not reliable.¹⁴⁻¹⁷

Teaching critical thinking

Although critical thinking skills are given limited explicit attention in standards for medical education, they are included as a key competency in most frameworks for national curriculums for primary and secondary schools in many countries.¹⁸ Nonetheless, much health and science education, and education generally, still tends towards rote learning rather than the promotion of critical thinking.^{19,20} This matters because the ability to think critically is an essential life skill relevant to decision making in many circumstances. The capacity to think critically is, like a lot of learning, developed in school and the home: parental influence creates advantage for pupils who live in homes where they are encouraged to think and talk about what they are doing. This, importantly, goes beyond simply completing tasks to creating deeper understanding of learning processes. As such, the "critical thinking gap" between children from disadvantaged communities and their

more advantaged peers requires attention as early as possible.

Although it is possible to teach critical thinking to adults, it is likely to be more productive if the grounds for this have been laid down in an educational environment early in life, starting in primary school. Erroneous beliefs, attitudes, and behaviours developed during childhood may be difficult to change later.^{21 22} This also applies to medical education and to health professionals. It becomes increasingly difficult to teach these skills without a foundation to build on and adequate time to learn them.

Strategies for teaching students to think critically have been evaluated in health and medical education; in science, technology, engineering, and maths; and in other subjects.²³ These studies suggest that critical thinking skills can be taught and that in the absence of explicit teaching of critical thinking, important deficiencies emerge in the abilities of students to make sound judgments. In healthcare studies, many medical students score poorly on tests that measure the ability to think critically, and the ability to think critically is correlated with academic success.^{24 25}

Evaluations of strategies for teaching critical thinking in medicine have focused primarily on critical appraisal skills as part of evidence based healthcare. An overview of systematic reviews of these studies suggests that improving evidence based healthcare competencies is likely to require multifaceted, clinically integrated approaches that include assessment.²⁶

Cross sector collaboration

Informed Health Choices, an international project aiming to improve decision making, shows the opportunities and benefits of cross sector collaboration between education and health.²⁷ This project has brought together people working in education and healthcare to develop a curriculum and learning resources for critical thinking about any action that is claimed to improve health. It aims to develop, identify, and promote the use of effective learning resources, beginning at primary school, to help people to make well informed choices as patients and health professionals, and well informed decisions as citizens and policy makers.

The project has drawn on several approaches used in education, including the development of a “spiral curriculum,” measurement tools, and the design of learning resources. A spiral curriculum begins with determining what people should know and be able to do, and outlines where they should begin and how they should progress to reach these goals. The basic ideas are revisited repeatedly, building on them until the student has grasped a deep understanding of the concepts.^{28 29} The project has also drawn on educational research and methods to develop reliable and valid tools for measuring the extent to which those goals have been achieved.³⁰⁻³² The development of learning resources to teach these skills has been informed by educational research, including educational psychology, motivational psychology, and research and methods for developing learning games.³³⁻³⁵ It has also built on the traditions of clinical epidemiology and evidence based medicine to identify the key concepts required to assess health claims.²⁹

It is difficult to teach critical thinking abstractly, so focusing on health may have advantages beyond the public health benefits of increasing health literacy.³⁶ Nearly everyone is interested in health, including children, making it easy to engage learners. It is also immediately relevant to students. As reported by one 10 year old in a school that piloted primary school resources, this is about “things we might actually use instead of things we might use when we are all grown up and by then we’ll forget.” Although the current evaluation of the project is focusing on outcomes relating to appraisal of treatment claims, if the intervention shows promise the next step could be to explore how these skills translate to wider educational contexts and outcomes.

Beyond critical thinking

Exciting opportunities for cross sector collaboration are emerging between healthcare and education. Although critical thinking is a useful example of this, other themes cross the education and healthcare domains, including nutrition, exercise, educational neuroscience, learning disabilities and special education needs, and mental health.

In addition to shared topics, several common methodological and conceptual issues also provide opportunities for sharing ideas and innovations and learning from mistakes and successes. For example, the Education Endowment Foundation is the UK government’s What Works Centre for education, aiming to improve evidence based decision making. Discussions hosted by the foundation are exploring how methods to develop guidelines in healthcare can be adapted and applied in education and other sectors.

Similarly, the foundation's universal use of independent evaluation for teaching and learning interventions is an approach that should be explored, adapted, and applied in healthcare.

Since the development and evaluation of educational interventions are separated, evaluators have no vested interest in the results of the assessment, all results are published, and bias and spin in how results are analysed and presented are reduced. By contrast, industry sponsorship of drug and device studies consistently produces results that favour the manufacturer.³⁷

Another example of joint working between educators and health is the Best Evidence Medical Education Collaboration, an international collaboration focused on improving education of health professionals.³⁸ And in the UK, the Centre for Evidence Based Medicine coordinates Evidence in School Teaching (Einstein), a project that supports introducing evidence based medicine as part of wider science activities in schools.³⁹ It aims to engage students, teachers, and the public in evidence based medicine and develop critical thinking to assess health claims and make better choices.

Collaboration has also been important in the development of the Critical Thinking and Appraisal Resource Library (CARL),⁴⁰ a set of resources designed to help people understand fair comparisons of treatments. An important aim of CARL is to promote evaluation of these critical thinking resources and interventions, some of which are currently under way at the Education Endowment Foundation. On 22 May 2017, the foundation is also cohosting an event with the Royal College of Paediatrics and Child Health that will focus on their shared interest in critical thinking and appraisal skills.

Education and healthcare have overlapping interests. Doctors, teachers, researchers, patients, learners, and the public can all benefit from working together to help people to think critically about the choices they make. Events such as the global evidence summit in September 2017 (<https://globalevidencesummit.org>) can help bring people together and build on current international experience.

Contributors and sources: This article reflects conclusions from discussions during 2016 among education and health service researchers exploring opportunities for cross sector collaboration and learning. This group includes people with a longstanding interest in evidence informed policy and practice, with expertise in evaluation design, reviewing methodology, knowledge mobilisation, and critical thinking and appraisal.

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