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Learning, teaching and assessment in health professional education and scholarship in the next 50 years

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Abstract

This paper explores how health professional education and scholarship is likely to evolve over the next 50 years. Recognising the ambitious nature of this goal, we have adopted an approach of "looking back to predict the future", drawing on past trends and lessons learnt to offer some predictions and recommendations. In doing so, we are mindful that recent advances in technology, especially related to generative artificial intelligence (AI), have added a further layer of complexity. The rapid rate of maturation of these technologies and the accompanying array of AI-based software solutions suggest that the educational landscape is likely to change dramatically—and continuously—over the foreseeable future. Within this context, it may seem premature to predict the future or make recommendations. However, in this paper we argue that urgent action is needed by educators to engage with the evolving landscape and to proactively develop models to harness the full potential of emerging technologies. Six themes are addressed, including: 1) the evolving role of educators and education providers, 2) innovative educational models and ethical frameworks, 3) future-focused competencies, 4) authentic assessment, 5) interprofessional education and 6) educational scholarship. This paper proposes a set of recommendations with the intention of stimulating critical discourse that can potentially lead to ongoing exploration of relevant issues.

Keywords: future of health professional education; artificial intelligence in education; pedagogical responses to technology; future-focused competencies; authentic assessment; educational scholarship; interprofessional education

Introduction

This paper explores how health professional education and scholarship may evolve over the next 50 years. While acknowledging that any predictions over a 50-year period

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have a high chance of missing the mark, the authors posit that we urgently require a starting point to stimulate scholarly discourse that could, in turn, lead to meaningful responses. Predictions and recommendations are presented according to six key themes, which have been informed by a careful analysis of current trends, with the view to stimulating a deeper exploration of these issues across the wider health professional education community.

Clinical context

The recent Topol (2019) review and other future-focused analyses of emerging trends in healthcare practice describe innovations in machine learning, artificial intelligence (AI), data security with blockchain technology, data analytics and advanced algorithms paving the way for consumer-driven healthcare and better health outcomes (Lattouf, 2022; WHO, 2021). These advances aim to empower patients with access to precise and personalised information, leading to the emergence of entirely new models of care (Australian Digital Health Agency, 2020; Elsevier Health, 2023). Wearable devices are already facilitating the collection of data for more rapid and accurate diagnoses and tailored management plans, and fields such as genomics have opened doors to personalised care, offering the potential for significant improvements in health outcomes (Mattick et al., 2014).

Fast forward another 50 years, and it is not a stretch to see the landscape of healthcare dramatically enhanced with significant advances in technology, groundbreaking discoveries in illness and disease prevention and radical shifts to genuine person-centred care. Artificial intelligence (AI) will likely augment every aspect of healthcare, addressing the challenge of providing cost effective and complex care at scale. Large language models (LLMs) will assist health professionals with documentation, clinical decisions and communication (Khan et al., 2023). AI-powered algorithms that predict and prevent ailments before they even manifest could eliminate disease across populations, thus addressing societal health challenges (Nia et al., 2023). Advances in genomics may enable bespoke treatments tailored to each patient (O'Shea et al., 2022), and telehealth and other communication technologies will bring healthcare to the most remote corners of the globe (Gajarawala & Pelkowski, 2021).

Importantly, collaborative practice is more likely to be the norm, with interdisciplinary teams working together, transcending professional silos and leveraging the power of technology to revolutionise patient care. Paradigm shifts, as outlined by philosophers of science, such as Thomas Kuhn, will occur rapidly, transforming models of care towards adoption of a more holistic, person-centred care system being accepted as "normal" (van der Veen et al., 2023). The predominance of medicine over other healthcare professions will shift towards true interprofessional collaboration. In this future world, healthcare will be a proactive and predictive endeavour, focusing not just on physical health but also on mental and social wellbeing. The biopsychosocial model (Engel, 1977) will continue

to influence healthcare, with consideration of the interrelated domains of biology, social factors and psychological determinants of health within a holistic approach. There will be a focus on preventative healthcare, with the recognition that whilst healthcare of the future might eradicate some diseases and illnesses, physical, psychological and social ill-health will be further driven and influenced by modifiable lifestyle factors. Public health will be core as a discipline and governments will invest heavily in health promotion campaigns and policies to encourage healthy populations and effective systems-based approaches. Patients will be respected as integral members of the healthcare team and will be involved in proposing and designing research as well as participating in clinical decision making (Scholz, 2022). Cultural safety will be critical for delivering effective care to increasingly diverse populations, enabling autonomy and choice in delivery of care (Anton-Solanas et al., 2022; Betancourt, 2006; Curtis et al., 2019). Recognising the detrimental effects of some healthcare practices and behaviours on climate change, and subsequently ill-health (Wellbery et al., 2018), health professionals will be appropriately skilled to moderate their practices to reduce the health footprint on the environment.

Higher education institutions will continue to play a critical role in shaping the healthcare professionals of tomorrow, equipping them to meet the evolving demands of practice. However, given the current and predicted developments in healthcare, it is timely to question whether health professional education is evolving adequately to prepare students for future practice. This paper highlights questions around educational readiness for future healthcare practice, makes informed predictions of the future of education and provides recommendations to adapt to the challenges of the future. We posit that educational institutions need to urgently recognise and respond to the anticipated significant changes that healthcare practice will undergo in the near future.

Looking back to move forward

We can learn much from history and, particularly, from philosophical frames grounded in the region. This "whakataukī", or proverb, expresses a Maori perspective of time, where the past, present and future are intertwined: "I walk backwards into the future with my eyes fixed on my past" (Rameka, 2016).

Over the course of history, some aspects of health professional education have undergone significant transformation. For example, advances in technology and pedagogical approaches have resulted in more authentic, flexible and student-centred learning experiences, especially in pre-clinical education. The incorporation of multimedia resources, online learning platforms and interactive simulations has enriched learning experiences, fostering active engagement and collaboration among students. The COVID-19 pandemic was a driver for much of this change (Hall Dykgraaf et al., 2021), which has had a lasting impact on some professions, such as psychology, where substantial parts of the program are now delivered entirely online (Garivaldis et al., 2020)—a feature that would have previously been viewed as impossible and inappropriate. Increasingly,

educators and funding bodies are embracing the scholarship of learning and teaching and modern educational practices, resulting in continuous cycles of improvement. These changes serve as a foundation for our understanding of the dynamic nature of education and provide valuable insights as we look ahead to the next 50 years.

Health professional education

While classroom-based education has experienced significant transformations, the pace of change in clinical education has been relatively slower. Clinical apprenticeships often continue to be perceived as the pinnacle of authentic learning, where students learn alongside expert practitioners with real patients in the clinical setting (Duval et al., 2017; Emanuel, 2020; Simpson et al., 2018; Sklar, 2019). This perception is potentially a barrier to the use of digital technologies to augment clinical education (Duval et al., 2017; Emanuel, 2020; Simpson et al., 2018; Sklar, 2019). Furthermore, while promising new models of education are still being realised—e.g., student-led interprofessional clinics (Kent et al., 2016) and integrated longitudinal community-based placements (Thistlethwaite et al., 2013)—these new models are often constrained by traditional curriculum design and course delivery structures that operate within uni-professional educational frameworks and by government funding models. This issue is often compounded by service delivery models in the health sector that mostly favour multidisciplinary practice, at best, as opposed to genuine collaborative practice.

Cultural safety

The current state of graduating culturally safe health professionals is a mixed picture. While there is a deliberate effort to integrate cultural safety into health programs in Australia and New Zealand, progress is slow. There remains a significant gap in ensuring that graduates are adequately prepared to provide safe and effective care. Many medical schools, for example, have introduced cultural competency training with a specific focus on Indigenous health to enable a more inclusive and equitable healthcare environment. However, the effectiveness of these efforts varies, and there remains a paucity of evidence and too few Indigenous faculty in Australia to ensure sustained development of curricula and continuous improvement. Moreover, the real measure of success is in the transition from university to clinical practice, where graduates may still face challenges in applying their knowledge to real-world patient care, particularly in navigating complex healthcare systems. Cultural capability in providing care for wider cultural diversity, as seen in Australia and New Zealand, remains an area that requires more attention.

Agility

Health professionals of the future will require skills to navigate the rapidly evolving and dynamic healthcare landscape, and educational programs will need to adapt quickly if they are to remain relevant in this fast-changing environment. For example, health professionals must understand the impact climate change has on health and develop core

competencies necessary to respond accordingly (Sorensen et al., 2023). Although many accreditation standards recognise the importance of this competence for future health professionals, climate change education is inadequately integrated in health professional education curricula.

In a world where constant change is a given, education providers must accept that frequent curriculum reform and new models of delivery are inevitable, while minimising risks and maintaining standards. This is not, by any means, an easy path to tread, and it will require innovative ideation and collaboration at the highest levels. The need for this agility and nimbleness is highlighted by recent swift transformations in education design and delivery brought about by the COVID-19 pandemic (Hall Dykgraaf et al., 2021; Wilson et al., 2021). A more recent example of education struggling to keep up with change relates to new generative AI technologies. Education institutions are now hastily formulating policies and practices to adapt to this new landscape being shaped by technologies such as Chat Generative Pretrained Transformer (ChatGPT) (Loh, 2023). The reactive nature of these responses can potentially be quite damaging, with hasty decisions leading to a range of unintended consequences. Educational institutions need to proactively invest time and resources to drive meaningful change, drawing on technology as an enabler rather than as a disruptor.

A vision for future health professional education

As we peer into the future of health professional education, we are met with an exciting and transformative landscape that promises to reshape the way we train the future health workforce. In the following subsections, we delve into six aspects of this vision, with the aim of provoking deep consideration of the type of education system that will meet the evolving needs of healthcare and will appropriately prepare the next generation of healthcare professionals to thrive in a rapidly changing world. Figure 1 provides a visual summary of our predictions in these six areas, with corresponding recommendations for consideration. These recommendations are not insubstantial and cannot be carried out by individual champions but, rather, require the collective commitment, engagement and collaboration of sectors, higher education providers and peak bodies if they are to be realised.

Theme 1: The evolving role of educators and education providers

Prediction 1: The role of educators and education providers will be significantly transformed

As the rate of knowledge generation exponentially increases, the role of education providers, including universities, will continue to evolve.

The role of educators is expected to undergo significant transformation, adopting a framework that encompasses curation, creation and moderation (Minter et al., 2021). Educators will take on the responsibility of guiding students towards evidence-based resources that are relevant to their specific stages of learning, while also incorporating

progressive pedagogical approaches (Caverzagie et al., 2019; Mallin et al., 2014; Nordquist et al., 2019). They will also need to be adept at designing highly customised curricula for personalised learning, tailored to students' individual learning needs. To effectively fulfill this evolving role, educators will need to be highly proficient in accessing and using an array of educational and communication technologies, and competent in providing the necessary support to varying levels of digital fluency among students (Minter et al., 2021).

In the realm of health professional education, the integration of AI and machine learning is envisioned as a complement to, rather than a replacement for, the roles of educators (Masters, 2019). By embracing these changes, educators will play a crucial role in facilitating meaningful learning experiences in the digital age of health professional education. The role of the educator will expand to include patients, clients and other relevant stakeholders in the community, who will be formally recognised (and titled) as valued members of faculty and training facilities.

Recommendation 1: Foster collaboration between educators, students and community stakeholders to facilitate a collective reshaping of the role of educators and education providers

The significant transformations outlined above can be viewed more as a revolution than a mere evolution of educational practice. Transformation on such a scale cannot be undertaken by individual bodies. Wide consultation at national and international levels is required to agree on high-level principles that will guide educational reform. Critical issues around accreditation of health professionals will need to be examined carefully. While accreditation requirements may sometimes be seen as a barrier to innovation, this may be a time for accrediting bodies to invite and encourage innovation and scholarly activities that could meaningfully address these challenges. As this transition occurs, attention will need to turn to continuing professional development of educators. This will be a crucial element in the transformation that is needed and will address potential discomfort that is likely to accompany change on the scale that is on the horizon.

Theme 2: Innovative educational models and ethical frameworks

Prediction 2: New educational models will emerge to support highly personalised learning

It is likely that health professional education will undergo significant changes in *how* students learn. Educational theory will evolve to inform new models of education, which will support highly personalised learning, harnessing the power of existing and future technologies (including technologies that are yet to be invented). With advances in simulation and other immersive technologies (e.g., mixed reality), students will be able to interact with digital simulations of patients and medical scenarios in increasingly rich and seamless ways. This will allow the creation of virtual, personalised clinical learning experiences with tailored feedback, enabling the development of a wider range of clinical skills in a safe and controlled environment.

Through AI and emerging pedagogies such as "generativism" (Pratschke, 2023), students will have the opportunity to learn in a manner aligned with their individual preferences, as personalised rewards such as badges and levels can be incorporated, effectively gamifying their educational journey. Generative AI can serve as scenario generator, personal tutor, feedback generator, content creator, virtual peer and more (Pratschke, 2023). Additionally, we will see further advances in AI generating educational material that meets the specific needs and current understanding of each student, enhancing the effectiveness and efficiency of their learning experiences. In particular, students will have access to a greater number of feedback loops with both AI chatbots and human educators.

As these systems mature, classroom-based learning will undergo a transformation to align with the principles and practices of clinical education more closely. This shift will be driven by the recognition of the effectiveness and relevance of authentic learning experiences, also acknowledging the rapid evolution of the practice context. Students will engage in hands-on activities that simulate real-world clinical scenarios, allowing them to develop and apply their knowledge and skills in practical settings. Redefined apprenticeship models will be incorporated, where students work closely with experienced healthcare professionals, fostering mentorship and experiential learning, with significant input from AI-based learning systems. Furthermore, virtual patients will become more sophisticated and realistic, providing students with opportunities to practise clinical skills, enhance their communication, receive timely and targeted feedback and develop critical thinking in safe and controlled environments. Additionally, with the increasing use of artificial intelligence and automation, students may be trained to work alongside these technologies, which would require new approaches to clinical education. While AI education tools are unlikely to replace authentic experiences in the workplace, they are likely to significantly enhance classroom-based and simulation-based education. The incorporation of virtual experiences will provide a solution to the increasingly important problems related to the availability of clinical placements and could help to optimise the use of clinical supervision opportunities (Bogossian & Craven, 2021; Fraher & Brandt, 2019; Thibault, 2020).

Recommendation 2: Develop innovative educational models and ethical frameworks to support new ways of learning, teaching and assessment

A meaningful response to maturing AI will require the development of innovative educational models that harness the power of emerging technologies. This will require a deep rethink of the role of humans and technology in healthcare. While many current discussions focus on the potential of technology to replace humans, a path that is likely to be more meaningful is one that fosters effective *partnerships* between humans and technology, to augment human capacity and allay some of the concerns around technology. We propose that clinical decision making of the future is likely to depend on meaningful integration of human reasoning with AI-driven systems. To prepare

our graduates to practise in such an environment, we will need to reshape our learning experiences and assessments to mirror real-world practice. This will require a significant rethink of education and will require revisiting educational principles to support these efforts. A reimagining of collaborative learning, for example, may include digital participants working alongside their human counterparts. This may lead to revisiting established theories, such as social learning theory, and may alter the meaning and make up of communities of practice.

As these significant transformations take place, there will rightly be concerns around ethical and legal aspects. Leaders in health professional education need to take responsibility for developing appropriate frameworks to govern these emerging new ways of living, working and learning. Critical issues around access, privacy, safety, trust and bias need to be addressed, and frameworks need to be developed to guide ethical practice within appropriate legal frameworks. We need to build on work that has commenced in this area, noting that the rapid changes will require continuous updating of our frameworks. In the recent AMEE Guide on AI, Masters (2023) underscores that we need to be thinking about "guidelines and policies on the use of AI tools by both students and faculty in all aspects of education, including lesson creation, teaching, assessment-taking, learning, grading, citing and referencing" (p. 581). It is critical to acknowledge the extent to which new technologies will impact education. For example, Rigby (2019) outlines areas of challenges, including the ethics of AI in relation to educators', students' and patients' understandings of what AI can, and cannot do; balancing the benefits and risks of using AI; stakeholder informed consent; clarity about the role of virtual patients in medical and health professional education; and the legal and policy conflicts that can arise.

Theme 3: Future-focused competencies

Prediction 3: The competencies needed by future HPE graduates will significantly differ from those needed today

New skills and competencies will be required for novel models of care. As collaborative practice becomes a critical aspect of effective healthcare, HPE graduates will require highly developed collaborative practice competencies. These will include mutual respect among team members, knowledge of respective roles and the ability to negotiate role boundaries when providing patient care; and proficient communication with patients, families, communities and other healthcare professionals (Thistlethwaite et al., 2014).

While interpersonal behaviours are crucial for fostering collaboration, new areas of technical competence will also be essential to establish and coordinate seamless service paths and leverage digital tools to enhance patient care. Additionally, the future health workforce will require increased awareness and skills in genomics to enable accurate diagnoses and to identify targeted therapies (O'Shea et al., 2022). Future practitioners

will need to be adept at using a range of smart technologies to practise telemedicine and remote monitoring. Mastery of these new competencies will lead to seamless integration of human and digital capabilities, leading to significantly enhanced clinical expertise.

Graduates will also need to be adept in critically appraising emerging technologies in the context of an evolving evidence base. Health professionals will need to be able to tailor the use of technologies to, and juggle multiple sources of data from, their patients. With further maturation of decision-support systems, the role of clinicians will often involve analysing and critiquing the outputs of digital decision-support systems. Clinicians will need highly developed critical thinking skills to manage the ever-increasing range of options that will be available and to work in partnership with other health professionals and patients to select the management pathways that will be most relevant to each patient.

Digital technologies will also have a significant impact on the types of communication competencies that are required by health professionals. With the increasing use of telemedicine and virtual consultations, HPE graduates will need to learn how to effectively communicate with patients and other healthcare professionals remotely. This will involve developing proficiency in using video conferencing and other digital communication tools, as well as learning how to adapt their communication style to the virtual environment. It is important to note that these skills will extend well beyond the level that was seen during the emergency response to the pandemic.

Communication skills will also evolve to ensure culturally safe healthcare. As healthcare continues to grapple with health inequalities, the emphasis on cultural safety for health professionals is expected to increase, affecting positive change in care tailored to the needs of an increasingly diverse population. While recent changes to accreditation processes (e.g., the AMC standards relating to First Nations Peoples) (Australian Medical Council, 2023) are timely and welcome, consideration of cultural proficiency from a wider perspective is needed. This is particularly relevant to Australia and New Zealand, where we take pride in the cultural diversity of our populations.

Population-wide data and data from outside the hospital, such as those collected from wearable devices, are expected to have a significant impact on the competencies required by health professionals of the future. With the increasing availability of large amounts of data, HPE graduates will need to use data analytics and machine learning tools to better understand and address population health issues. The roles of public health and health promotion campaigns will become increasingly important (National Association of School Nurses, 2020). Within this emerging context, consideration of potential widening of disparities due to resource constraints deserves targeted attention.

As patient care models become more empowering and population based, students will need to develop competencies related to social accountability. For example, climate change competencies will be integrated into mainstream curricula to highlight the impact of climate change on global health and to provide graduates with skills to address these

challenges. Students will lead the charge in this space given their passion for "planetary health". The next generation of health professionals will play a frontline role in caring for patients whose health has been impacted by climate change.

As we recognise the need for this range of new competencies, careful attention is needed to concurrently identify competencies that may be less relevant to the future landscape. There needs to be explicit acknowledgement of the limitations of the human brain and the need to move away from unrealistic expectations of its capacity to retain knowledge. Individuals will become adept at distributing the cognitive load of thinking and cognition to technologies that will provide instant access to relevant information on an "as needed" basis. Thus, the skills to access and apply knowledge will be far more important than the ability to recall disciplinary detail.

Recommendation 3: Undertake a holistic review to develop future-focused competencies with flexibility to respond to ongoing change

The response to the major transformations noted above needs to be guided by a comprehensive review of competencies required by future graduates. This must be seen as a collective responsibility and requires a consultative, collaborative approach. The review will require a radical rethink of human competencies that will be required and which competencies may be less relevant when human practitioners work in close partnership with digital assistants and AI-driven support systems. This review will need to recognise the limits of human capacity and that our current practice of continuous addition to the curricular load is unsustainable. Deep questions around the meaning of human learning within the context of machine learning will need to be addressed. As new competencies become increasingly important, difficult decisions around what humans need to learn will need to be made. As human–machine partnerships mature, it is likely that our productivity could be significantly increased. This will likely eventuate as we start to recognise healthcare practitioners as human–digital partnerships rather than humans working in isolation.

As the amount of medical information available to healthcare professionals continues to grow, it will be essential for HPE graduates to know how to effectively navigate and use digital resources to inform their clinical decision making. As machine learning and artificial intelligence is increasingly used to assist with diagnostic and treatment planning, health professional students will need to be trained to understand these technologies and how to integrate them safely and ethically into their practice.

The review of competencies will also require a careful recalibration of standards and expectations related to clinical communication and professionalism. As noted above, this will be necessitated by newer ways of communicating, which may also involve shorter, more rapid communications, for example, in response to alerts from wearable devices.

Teaching about AI should include consideration of utilising AI ethically and appropriately in a clinical context and understanding how to interpret and explain AI results to patients (McCoy et al., 2020). This will most likely require new curricula and training programs to be developed to ensure that students are prepared for the changing landscape of healthcare and can effectively use these new technologies in their practice.

Students will require skills to provide care for a wider diversity of patients, for example, in underserved areas (Skochelak, 2010). This can be achieved by adapting educational programs to specifically focus on these skills and by ensuring that all aspects of diversity are reflected within student cohorts. Student selection processes into HPE programs will need to incorporate these elements to facilitate the development of a full range of cultural competencies.

Students will need to both prepare for and respond to climate-change-related threats to human health. Curricula will need to be developed to reflect this competency. Furthermore, future practitioners will need to be cognisant of their own impact on the environment and develop ways to practise and work in an environmentally conscious manner, reducing their carbon footprint and advocating for sustainable practice to protect their patients and their own professional livelihoods.

Theme 4: Authentic assessment

Prediction 4: Assessment practices will undergo a transformative shift to align with healthcare practice in a more authentic manner

The future of assessment will need to reflect the competencies required for practice in a rapidly transforming healthcare context. Health professionals will need to navigate a data-rich healthcare environment and will need appropriate digital literacies (Topol, 2019). The increasing availability of freely accessible content through information and communication technology, and cognitive surplus (Shirky, 2010), has implications for both learning achievement and healthcare practice.

Authentic workplace-based assessment (WBA) will mirror how healthcare professionals actually work, with instant access to information and decision support tools. Through "open-book" access of facts and figures, future assessment will need to evaluate students' use of all digital affordances and their incorporation of these into practice while also demonstrating competence in complex practical environments (Schuwirth & van der Vleuten, 2020). Programmatic assessment and the use of entrustable professional activities (EPAs) in workplace-based assessments have already emerged as essential tools to support dynamic learning and development of competencies but will further evolve through the incorporation of technology.

Objective structured clinical examinations (OSCEs) with standardised patients will similarly change to more closely simulate real clinical encounters and integrate digital competencies. These assessments will also amplify the importance of essential

skills for future healthcare practice, such as advocating for the patient, provision of culturally sensitive care, ethical reasoning and provision of coordinated care through interprofessional collaboration. Critical thinking and problem solving will continue to be essential skills that are assessed in novel ways using more complex and context-rich problems. The use of AI and machine learning may be harnessed to analyse students' responses and provide personalised feedback on their decision making. There is likely to be a greater focus on self-assessment, where students can draw upon digital support systems to evaluate their own decisions. This focus towards assessment *for* learning will enable personalised learning journeys and will challenge the current norm of time-bound educational programs. Electronic portfolios (ePortfolios) will be integral for documenting and showcasing students' (and subsequently health professionals') personalised journeys and mastery of competencies throughout their lifelong learning pathways (Boud, 1995; Bramley & McKenna, 2021; Cronbach & Meehl, 1955; Epstein & Hundert, 2002; Gingerich et al., 2017; Kane, 2006; Malau-Aduli et al., 2023; Schuwirth & van der Vleuten, 2020; Shorey et al., 2019; Ten Cate, 2013).

Assessments of the future may be patient centred and involve students receiving feedback from patients and families, allowing them to provide insights into students' communication skills. These will include feedback on students' skills in co-designing care plans. Assessments will be tailored to meet principles of equity and will meaningfully cater to the needs of student diversity.

Recommendation 4: Undertake a comprehensive review of assessment principles and practices to ensure that assessment is truly authentic

The wide-ranging transformations occurring in healthcare practice will require graduates to acquire an entirely new set of competencies. Ensuring this competence will require a radical departure from current assessment practices. The concept of authentic assessment will need to be revisited and revised to ensure that assessment truly mirrors contemporary healthcare practice. Authentic assessment of interprofessional collaboration should include feedback to students from all team members, including student coordinators and administrators. Assessment will also include assessing the ability of graduates to work alongside systems that they will be using in actual practice, such as AI-informed diagnostic systems. The ability to work effectively with these technologies, and understand their limitations, will itself be a competence that needs to be assessed. Feedback and evaluation need to radically change in tandem with the emergence of new models of care, such as remote monitoring and home-based care.

The externalisation of memory and ubiquitous use and availability of information and communication technologies in both education and the workplace will mean that assessment needs to shift from assessing students' mastery of knowledge, skills and competencies to their proficiency to apply these skills appropriately (Schuwirth & van der Vleuten, 2020). A shift to competency-based assessment, where students are evaluated on

their ability to demonstrate specific skills and competencies rather than on time spent in training will be needed. This approach will require greater personalisation and flexible assessment pathways. There will be a need for more longitudinal scaffolded assessment with emphasis on formative and timely feedback to help students identify and address areas of improvement (Ryan et al., 2023).

Urgent attention is needed to upskill assessors. This upskilling needs to focus on understanding revised graduate competencies, revised assessment practices and training in technology integration that supports assessment. Educators require training to leverage technology to create authentic and immersive assessment experiences. As interprofessional education (IPE) becomes more mainstream, assessors will require training to assess students' abilities to effectively collaborate in healthcare teams. This training will require a process of "unlearning" some tenets that were previously considered foundational. For example, this may require a new understanding of what students need to be able to do with, and without, the use of external resources and digital support systems. The wide-ranging nature of these changes will require a coordinated approach, with consultation at national and international levels.

Theme 5: Interprofessional education

Prediction 5: Interprofessional education and practice will advance together, fostering collaborative and integrated approaches

Interprofessional education is poised to thrive alongside increased recognition of the value of interprofessional care. The growing incidence of chronic disease, an ageing population, inequities of access (notably for Indigenous communities and those living in rural areas) and escalating expenses will drive the move towards integrated care and other models that focus on patient needs (World Health Organisation Regional Office for Europe, 2016). Consequently, health professional students will engage in longitudinal and team-based placements, enabling them to experience authentic interprofessional collaboration and gain a comprehensive understanding of the healthcare ecosystem (Thistlethwaite & Xyrichis, 2022). From the outset, students will be embedded in authentic healthcare practices, learning their professional theory through online learning but learning their cultural practice through a greater number and depth of placements. The logistical challenge of allowing health professional students from multiple disciplines to learn with, from and about each other will be met via longitudinal community-based clinical placements. Digital solutions will evolve to facilitate this process and will optimise clinical learning experiences through a judicious mix of real-world and simulated experiences.

The field of IPE will continually evolve towards more interdisciplinary work. While clinicians will continue to draw on their scientific knowledge and clinical judgement to diagnose, prevent and maintain a patient's physical and mental health, there will be more shared decision making, involving healthcare providers, patients and digital platforms.

This will extend to the codesign of treatment plans, with contributions across health professions. The predominance of medicine will shift to a more equal and egalitarian team, where patients and their chosen social supports will be respected and included in decision making in an authentic way. Collaborative practice assessment tools (see, for example, Schroder et al., 2011) will be increasingly applied and refined to improve both teaching and learning experiences and patient care (Schroder et al., 2011).

Recommendation 5: Meaningfully address barriers to IPE

Barriers to the implementation of meaningful IPE will need to be addressed. For example, there is a need to recognise that traditional siloed, uniprofessional course structures will be an insufficient training ground for authentic interprofessional collaborative practice in integrated healthcare service models. A greater emphasis is also needed on end-to-end training pipelines in underserved regions, where health professional students can learn with, from and about each other from day one of their training. The focus must meaningfully shift to the patient and how the health professional team can best coordinate their care across a range of needs and services.

The proposed evolution of IPE will need to be underpinned by a strong commitment from senior leadership and an integration of currently fragmented curriculum governance models. The primary objective of IPE is to equip graduates with the necessary skills and knowledge for the health workforce. Improving IPE, incorporating technological innovation and overcoming inevitable logistical barriers will require the education and health sectors to unite to develop cross-sectorial approaches to education and professional practice and to develop a continuum of IPE spanning preregistration to being part of continuing professional learning (O'Keefe et al., 2020).

Theme 6: Educational scholarship

Prediction 6: Educational scholarship will receive due recognition as it evolves to address emerging challenges and develop evidence-based solutions

Educational scholarship will become critically important within this emerging context. In order to develop evidence-based solutions, we will require systematic exploration of these issues through carefully designed educational research projects. The future is likely to be informed by a wide range of scholarly activities that explore these issues in collaboration with other relevant disciplines (data science, engineering, machine learning and AI). Key aspects such as professional identity formation will be explored in depth, with due recognition of areas such as cultural competence. The possibility of industry-driven research needs to be considered, along with a consideration of the pros and cons of such developments.

Recommendation 6: Recognise and develop mechanisms to support the key role of educational scholarship in developing evidence-based solutions to current and future challenges

A range of carefully designed educational research projects are critical to develop meaningful solutions to emerging challenges. The current status of educational research, the very limited funding opportunities and limited career advancement opportunities need to be acknowledged. Institutions need to value educational research and ensure that institutional processes support educational scholarship and the scholars who undertake

Figure 1

Visual Representation of the Themes, Predictions and Recommendations

this important work. As educational research becomes increasingly valued in response to transformations in the practice and educational landscape, questions of support and funding for these projects need to be carefully examined. To avoid conflicts of interest from commercial entities, it may be prudent to ensure adequate funding from within the health and education sector. This will need to be balanced with the potential benefits of collaborating with industry partners. A judicious middle ground may be found through wide consultation with relevant groups. Educational leadership will need to pay careful attention to the need for robust educational scholarship and will need to act urgently to establish mechanisms to support educational scholarship. This will require dedicated support for established researchers and mentorship pathways to nurture researchers of the future. As education providers around the globe struggle with emerging challenges, a coordinated, collaborative approach to research is recommended.

Final thoughts

This paper explores the difficult question of how health professional education may evolve over the next 50 years. The authors acknowledge that the predictions and recommendations presented above may only be relevant within the current context and will need to be revisited on a continual basis, especially in light of ongoing technological maturation. This highlights a further key message of this paper—that the healthcare landscape is likely to be in a continuous state of flux for the foreseeable future, and future educational models need to incorporate flexibility and adaptability. A key aim of the paper is to provide a starting point for discussions and exploration of the range of issues noted above. Readers are invited to critique the predictions and recommendations and participate in a robust discussion about the challenges that we face. The ideas presented in this paper may also open areas for further exploration, which may lead to scholarly examination of relevant aspects.

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