

Developing and sustaining digital professionalism: a model for assessing readiness of healthcare environments and capability of nurses

Carey Ann Mather ,¹ Elizabeth Cummings²

To cite: Mather CA, Cummings E. Developing and sustaining digital professionalism: a model for assessing readiness of healthcare environments and capability of nurses. *BMJ Health Care Inform* 2019;**26**:e100062. doi:10.1136/bmjhci-2019-100062

Received 28 May 2019
Revised 15 October 2019
Accepted 23 October 2019

ABSTRACT

Introduction Technological change in healthcare demands new ways of working. Access to, and use of, digital technology by nurses in Australia lags behind other professions. Governance frameworks and professional standards guide scopes of practice; however, there is an urgent need for current registered nurses to master using digital technology and model digital professionalism to the next generation. Sustaining digital professionalism requires organisational readiness to accommodate changing technological environments.

Methods Previous original research findings investigating the nature and scope of digital technology use by nurses were systematically analysed. With reference to current understandings of capability, a matrix for assessing organisational readiness of capability of digital technology use by nurses was developed.

Results The 4E3P digital professionalism model articulates the elements necessary for establishing organisational readiness and assessing the capability development of individuals and groups. When the physical and social environment is conducive and the 4E elements of equipment, electronic access, engagement and education are present, preparedness, proficiency and professional behaviours can be nurtured and supported.

Discussion The model describes the physical and social attributes that enable capability development for sustaining digital professionalism to advance nursing practice. When elements of the matrix are lacking, both individuals and groups miss opportunities to develop and sustain digitally professional behaviour.

Conclusion It is imperative that healthcare environments in Australia support the development of digital professionalism. Deployment of the 4E3P digital professionalism model will enable identification and remediation of challenges, barriers or risks to promote sustainability found within physical and social healthcare environments.

INTRODUCTION

Technological change has transformed how healthcare is delivered globally.^{1 2} As digital technology becomes embedded within healthcare environments, there will be more of a focus on the development of capability of health professionals in digital professionalism

Summary

What is already known?

- ▶ The Australian Digital Health Agency National Digital Health Strategy acknowledges health professionals need support to become confident and capable users of digital health.
- ▶ Currently, governance structures within the nursing profession do not adequately direct or support the development of digital professionalism of nurses within healthcare environments.

What does this paper add?

- ▶ Digitally professional behaviour by nurses is integral for ensuring safe, effective and appropriate care of consumers.
- ▶ Using a digital professionalism model to guide transition towards the provision of an environment where nurses can develop capability in digital health is imperative.
- ▶ This paper offers a model for nurses to assess organisational readiness, to transition into digitally capable health professionals and to support sustainable digitally professional healthcare environments.

as part of their professional identity formation.^{3 4} Digital professionalism has emerged in response to the need for health professionals to understand, develop and know appropriate professional behaviour when using digital media.⁵ There is currently no accepted or standard definition of this term.^{4 6}

The term digital in this context refers to the use of information communication technology to transfer information for administrative, clinical, education or research purposes. In Australia, there is a complex set of factors that has contributed to hindering digital transformation, which has created a digital technology paradox. There is an inability of health professionals, especially nurses, to access digital technology in the workplace, while it is increasingly being recognised that its use has the potential to improve patient



© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹School of Nursing, University of Tasmania, Launceston, Tasmania, Australia

²School of Nursing, University of Tasmania, Hobart, Tasmania, Australia

Correspondence to

Dr Carey Ann Mather;
Carey.Mather@utas.edu.au

outcomes.⁷ Digital transformation within the health professions cannot occur until governance structures at systems and organisation levels support its legitimate access and use of digital technology.⁸ This lack of guidance has contributed to a lost opportunity to model digital professionalism that continues as new graduates become enculturated to social and cultural norms of their profession and workplaces.^{9–11} The global discourse regarding the development of nursing competencies in digital health has continued for over 15 years.^{12–14} However, no consensus regarding agreed nursing informatics competencies to guide legitimate use of digital technology has been achieved.^{15 16}

Digital technology is ubiquitous, and its use is increasingly accepted within healthcare environments.^{13 14 16 17} The development of digital professionalism by health professionals is inherent in the Australian Digital Health Agency National Digital Health Strategy (National Strategy).¹⁷ However, to progress the tenets of Strategic Priority 6, which states Australia needs a 'workforce confidently using digital health technologies to deliver health and care' (Australian Government, page 44),¹⁷ will require amelioration of current barriers and challenges.¹⁸ This priority can be achieved by organisations and individuals supporting integration of the elements within nursing informatics competency standards^{15 19} into workflows. For the workforce challenges to be met by 2022 necessitates the development of models to support and assess organisational readiness and capability development of digital professionalism of health professionals. Safe, effective and appropriate use of digital technology are paramount to maintain quality and safety of healthcare service delivery within healthcare environments.⁸

The purpose of a digital professionalism model

Models are useful in nursing as it is the health profession with the highest proportion of workers,²⁰ and the facilitation of a standardised and consistent approach will support sustainability of digital professionalism. Additionally, the profession is strategically placed to provide leadership in digital professionalism to other stakeholders. The National Strategy¹⁷ of developing a digital technology-prepared workforce by 2022 has created an urgent need to develop the capability of current registered nurses so that they can model safe, effective and appropriate behaviour.^{17 21} Current nurses can then induct and guide the access and use of digital technology to others for administrative, clinical, educational and research purposes.¹⁷ A digital professionalism model can be used to assess the readiness of individuals and organisations to advocate, support and sustain a digitally professional organisation. A theoretical model can be used to guide evaluation of readiness of organisations to accept the access and use of digital technology.²¹ It can also be used to assess the level of capability of individuals and groups in their development of digital professionalism within healthcare environments.^{22 23}

Developing and maintaining a consistent approach to embedding digital technology and developing digital professionalism across a broad range of healthcare settings require regulation at a national level. Nursing is a highly regulated profession as evidenced by the governance structure for accreditation of undergraduate nursing courses^{24–27} that can be beneficial and a hindrance to the profession. The benefits of regulation are expressed in the consistent high level of trust of nurses by the Australian public.²⁸ The Registered Nurse Standards for Practice²⁹ and Codes of Conduct³⁰ ensure nurses maintain high levels of capability in nursing practice. However, these governance structures can also lead to a lack of agility by members of the profession to advance nursing practices, which challenges accepted embedded culture.³¹

METHODS: THE 4E3P DIGITAL PROFESSIONALISM MODEL

The development of the 4E3P digital professionalism model is a culmination of 5 years of pragmatic mixed methods research.³² Each study was originally considered as a separate case that was analysed, reported and peer-reviewed independently (table 1).^{7–9 11 18} Excel (V.14.2.5) and SPSS (V.14.0) were used to analyse the quantitative surveys.^{7 18} Intrarater validation occurred with participants of the qualitative studies.^{8 9 11} For development of this model, the research was analysed as a multiple case study as described by Stake³³ and Miles.³⁴ Analysis of focus groups and interviews was undertaken using versions of Microsoft Excel. The data was coded from meaning units to open codes, labelled and reduced to axial and finally to selective codes, to enable subthemes to be revealed.³⁵ Reliability was sought through triangulation of the data, undertaken by the researchers, using the tenets of coding as expressed by Corbin and Strauss³⁶ and thematic analyses.^{35 37} Validation of interpretation also occurred throughout the research period by peer debriefing.³⁸ The independent findings and peer-reviewed publications provided validation regarding the research process. Triangulation of the studies enabled the researchers to synthesise the data and develop the model.

Elements on both axes of the matrix were identified from findings of previous original research^{7–9 11 18} where challenges, barriers, risks and benefits to accessing and using digital technology at point of care were identified. The synthesis of this research coupled with current understanding of capability^{22 23} and constructivist educational approaches^{39 40} underpinned development of the cells within the matrix. Progression towards digital professionalism by nurses can be achieved and sustained when the physical and social environment is conducive for learning.

RESULTS

The 4E3P digital professionalism model (4E3P Model) is a two-dimensional matrix consisting of a vertical and horizontal axis (table 2). The vertical axis describes the

Table 1 Summary of studies undertaken

Date of study	Date of publication	Method	Study group	Focus of systems theory level	Analysis	Ethics approval number	Reference number
2009	2013	Online questionnaire	Nurse supervisors	Individual	SPSS V. 14	H0011071	18
2012	2014	Online questionnaire	Nurse supervisors	Individual	Excel V. 14.2.5	H0012527	9
2014	2015	Focus group	Nurse supervisors	Individual	Thematic coding Microsoft Excel	H0013729	7
2014	2015	Focus group	Nurse supervisors	Individual, organisation and systems	Thematic coding Microsoft Excel	H0013729	11
2017	2018	Individual interviews	Nursing profession organisations	Organisation and systems	Thematic coding Excel (2016)	H0016097	8

four *E* (4E) elements of equipment, electronic access, engagement and education, which are all necessary for acceptance of digital technology and enable digital professionalism to flourish. When one or more of the 4E elements become unavailable, sustainability of digital technology is hindered and development of digital professionalism is at risk, as modelling cannot occur. The horizontal axis describes the continuum of capability that can develop if the 4E elements are present (table 2). The capability development levels of prepared, proficient and professional are known as the three *P* capabilities (3P). The increasing level of knowledge, skills, attitudes and behaviours that demonstrate the capability of nurses is a continuum they progress, as outlined by the descriptors within each column of the matrix.

All 4E elements of the vertical axis need to be present to enable development of the 3P continuum of capability of digital professionalism by nurses. Being prepared is the first level of capability for developing digital professionalism. Proficiency is accomplished when understanding and confidence in using digital technology increases. Reaching this level of capability requires sustained availability of the 4Es, enabling access and use of digital

technology for learning and opportunities for education about safe and appropriate use. Without engagement, even if the other 4E elements are present, proficiency cannot develop. A professional level is attained when an advanced level of practice can be demonstrated. Nurses who obtain professional capability have the capacity to support, guide and educate others in developing digital professionalism.¹⁹ These advanced practice nurses are change champions who can model, promote and support sustainability of safe, effective and appropriate access and use of digital technology within healthcare environments.^{17 22}

DISCUSSION

The 4E3P Model will enable nurses to maintain standards of practice, uphold codes of conduct and remain within their scope of practice by facilitating identification of risks at an individual or organisational level. Additionally, by deploying the model, sustainance of appropriate digital technology readiness can be monitored. Enabling nurses to advocate for continuous digital technology readiness within their workplaces is useful to support advances in

Table 2 The 4E3P digital professionalism model

Element	Prepared	Proficient	Professional
Equipment	Access available, able to use digital technology with guidance	Ability to connect for learning using a digital device as appropriate	Advanced practice in human computer interaction for enabling using digital technology for learning (troubleshooting issues)
Electronic access	Able to seek and retrieve digital information using digital technology	Discern credible digital information using digital technology	Capacity to teach others using digital technology
Engagement	Receptive to using a digital device for learning	Intrinsically motivated to use a digital device for learning	Change champions and show digital leadership in digital technology
Education	Foundation digital/information literacy and able to use a digital device with guidance	Ability to meet nursing/health informatics competency standards and able to use a digital device safely	Advanced practice in critical thinking and clinical reasoning when using a digital device



Figure 1 Stages of implementation.

nursing practice. The model also provides guidance for assessment of capability development within the nursing workforce. The 4E3P Model is a useful tool to assist with implementation, modelling and sustaining digital professionalism among the nursing profession.

The purpose of the development of the 4E3P Model is to provide an evidence-based framework for guidance to nurses and healthcare organisations about how to easily assess organisational readiness and capability development of individual and groups within the health profession workforce to promote digital professionalism.^{22 23 41} Digital professionalism needs simultaneous implementation with digital technology in healthcare environments as shown in figure 1. The National Strategy¹⁷ acknowledges the immediacy of legitimising the access and use of digital technology within healthcare environments and including digital professionalism is implicit in this task. Fixsen and colleagues^{42 43} have outlined the stages of implementation that can be applied to digital technology (figure 1).

Previously, access to, and use of, digital technology by nurses was stalled at exploration and adoption in Australia,⁴⁴ whereas the National Strategy¹⁷ now enables implementation of digital technology to be promoted and progression to sustainability encouraged. The directions proposed by Strategic Priority 6 mandate the need for workplace reform. The 4E3P Model can be used by organisations, individuals and groups to advocate and embrace the aims of the National Strategy.¹⁷ The model can be deployed within organisations to assess whether the *E* environment is available for individual or groups of nurses are able to develop capability in digital professionalism. Additionally, the recent advances in Australia and New Zealand regarding the position and guidance of nursing informatics can provide organisations with principles to advocate for advancement and sustainability of digital professionalism.^{15 19}

While Australian healthcare environments are grappling with the tenets of the National Strategy¹⁷ workforce priorities, the higher education sector also needs to implement the mandated information within the Australian Nursing and Midwifery Accreditation Council (ANMAC) nursing informatics explanatory note,²⁵ which states that the inclusion of health technology and informatics within undergraduate nursing courses at a technical, contextual and emancipatory level is imperative.²⁵ Undergraduate students need to develop capability and gain an understanding of safe, effective and appropriate use of digital technology in the workplace. Students need to develop knowledge, skills, attitudes and behaviour of digital professionalism that contribute to professional

identity formation. To assist with being prepared for digital professionalism within healthcare environments, the 4E3P Model can be utilised within classroom and simulation activities, prior to students undertaking work-integrated learning. Simultaneously developing the capability of undergraduate students and current registered nurses will promote a robust environment and consistent approach for the sustainability of digitally professional behaviour. There are overt opportunities for mutual learning and a diminished need for nurses to hide their digital device usage, which currently occurs in the workplace.^{8 31} Sanctioning the access and use of digital technology and promoting digital professionalism will alter the current narrative²⁰ and enable opportunities to overtly promote discourse about safe, effective and appropriate management of digital technology within healthcare environments. Prior to the implementation of legitimate digital technology use into healthcare environments, the 4E3P Model can be used to facilitate dialogue to advocate for the development of organisational guidelines about the access and use of digital technology that can support the ANMAC requirements.²⁵ Additionally, advancing nursing practice using digital technology can be reflected in the next review of the regulation of the scope of practice of registered nurses.⁴⁵

CONCLUSION

Discourse about the implementation of sanctioned access and use of digital technology is needed to ensure a consistent and sustained approach to developing capability of nurses within the higher education sector and within healthcare environments. The 4E3P Model provides an opportunity for nurses to assess workplace readiness, advocate for the 4E elements to be available and enable a real opportunity for nurses to advance nursing practice. The transition of nurses through the 3P continuum of the 4E3P Model towards the professional level will raise the profile of safe, effective and appropriate use of digital technology by nurses to other stakeholders within healthcare environments. The modelling of digital professionalism over time will ensure nurses remain the most trusted profession while providing safe, effective and appropriate 21st century healthcare service delivery.

Twitter Carey Ann Mather @CareyMather

Contributors The concept and design were developed by CAM. CAM had overall responsibility and undertook planning, implementation, analysis, interpretation and writing of the manuscript. EC contributed to analysis, interpretation and editing of the manuscript. Both authors read and approved the final version of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Carey Ann Mather <http://orcid.org/0000-0002-4301-0028>

REFERENCES

- O'Connor S, Hubner U, Shaw T, et al. Time for tiger to ROAR! technology informatics guiding education reform. *Nurse Educ Today* 2017;58:78–81.
- Rouleau G, Gagnon M-P, Côté J, et al. Impact of information and communication technologies on nursing care: results of an overview of systematic reviews. *J Med Internet Res* 2017;19:e122.
- Cain J, Romanelli F. E-professionalism: a new paradigm for a digital age. *Curr Pharm Teach Learn* 2009;1:66–70.
- Ellaway RH, Coral J, Topps D, et al. Exploring digital professionalism. *Med Teach* 2015;37:844–9.
- Mather C, Douglas T, O'Brien J, et al. Identifying opportunities to integrate digital professionalism into curriculum: a comparison of social media use by health profession students at an Australian university in 2013 and 2016. *Informatics* 2017;4:10.
- Bahr TJ, Crampton NH, Domb S. The Facets of Digital Health Professionalism: Defining a Framework for Discourse and Change. In: Shachak A, Borycki E, Shmuel PR, eds. *Health professionals' education in the age of clinical information systems, mobile computing and social networks*. 1st edn. Academic Press, 2017: 65–89.
- Mather C, Cummings E. Unveiling the mobile learning paradox. *Stud Health Technol Inform* 2015;218:126–31.
- Mather CA, Cummings EA, Gale F. Advancing mobile learning in Australian healthcare environments: nursing profession organisation perspectives and leadership challenges. *BMC Nurs* 2018;17:44.
- Mather C, Cummings E. Mobile learning: a workforce development strategy for nurse supervisors. *Stud Health Technol Inform* 2014;204:98–103.
- Noordegraaf M, Van der Steen M, Van Twist M. Fragmented or connective professionalism? strategies for professionalizing the work of strategists and other (organizational) professionals. *Public Adm* 2014;92:21–38.
- Mather C, Cummings E. Modelling digital knowledge transfer: nurse supervisors transforming learning at point of care to advance nursing practice. *Informatics* 2017;4:12–14.
- Staggers N, Gassert CA, Curran C. A Delphi study to determine informatics competencies for nurses at four levels of practice. *Nurs Res* 2002;51:383–90.
- Kinnunen U-M, Rajalahti E, Cummings E, et al. Curricula challenges and informatics competencies for nurse educators. *Stud Health Technol Inform* 2017;232:41–8.
- Borycki EM, Foster J, Sahama T, et al. Developing national level informatics competencies for undergraduate nurses: methodological approaches from Australia and Canada. *Stud Health Technol Inform* 2013;183:345–9.
- Australian College of Nursing, Health Informatics Society of Australia, Nursing Informatics Australia. *Nursing informatics position statement*. Canberra: Australian College of Nursing, 2017.
- Honey MLL, Skiba DJ, Procter P, et al. Nursing informatics competencies for entry to practice: the perspective of six countries. *Stud Health Technol Inform* 2017;232:51–61.
- Australian Government. *Australia's National Digital Health Strategy, Safe, seamless and secure: evolving health and care to meet the needs of modern Australia*. Canberra: ADHA, 2017.
- Mather C, Marlow A, Cummings E. Digital communication to support clinical supervision: considering the human factors. *Stud Health Technol Inform* 2013;194:160–5.
- Honey M, Collins E, Britnell S. Guidelines: informatics for nurses entering practice, 2018. Available: https://cdn.ymaws.com/www.hinz.org.nz/resource/resmgr/resources/Guidelines_Informatics_for_n.pdf
- Health Workforce Australia. Nurses in focus Adelaide: health workforce Australia, 2013. Available: <https://www.hwa.gov.au/sites/uploads/Nurses-in-Focus-FINAL.pdf>
- Butler-Henderson K, Gray K, Greenfield D, et al. The development of a national census of the health information workforce: expert panel recommendations. *Stud Health Technol Inform* 2017;239:8–13.
- O'Connell J, Gardner G, Coyer F. Beyond competencies: using a capability framework in developing practice standards for advanced practice nursing. *J Adv Nurs* 2014;70:2728–35.
- Bromley P. A paradigm shift from competence to capability in neonatal nursing. *J Neonatal Nurs*. In Press 2019;2019.
- Australian Nursing and Midwifery Accreditation Council. Australian nursing and midwifery accreditation Council registered nurse accreditation standards: Australian nursing and midwifery accreditation Council, 2012. Available: http://www.anmac.org.au/sites/default/files/documents/ANMAC_RN_Accreditation_Standards_2012.pdf
- Australian Nursing and Midwifery Accreditation Council. Health informatics and health technology - an explanatory note 2014: ANMAC, 2014. Available: https://www.anmac.org.au/sites/default/files/documents/20150130_Health_Informatics_Technology_Explanatory_Note.pdf
- Australian Nursing and Midwifery Accreditation Council. *Review of registered nurse accreditation standards consultation paper 1*. Canberra: Australian Nursing and Midwifery Accreditation Council, 2017.
- Australian Nursing and Midwifery Accreditation Council. *Review of registered nurse accreditation standards consultation paper 2*. Canberra: Australian Nursing and Midwifery Accreditation Council, 2018.
- Morgan R. Roy Morgan Image of Professions Survey 2016: Nurses still most highly regarded – followed by Doctors, Pharmacists & Engineers, Article 6797, 2016. Available: <http://www.roymorgan.com/findings/6797-image-of-professions-2016-201605110031>
- Nursing and Midwifery Board of Australia. Professional standards: NMBA, 2017. Available: <http://www.nursingmidwiferyboard.gov.au/Codes-Guidelines-Statements/Professional-standards.aspx>
- Nursing and Midwifery Board of Australia. *Professional standards*. Canberra: Nursing and midwifery board of Australia, 2017. <https://www.nursingmidwiferyboard.gov.au/codes-guidelines-statements/professional-standards.aspx>
- Mather C, Cummings E, Gale F. Mobile learning in nursing: tales from the profession. *Stud Health Technol Inform* 2018;252:112–7.
- Creswell JW, Maletta RC. *Qualitative research*. Thousand Oaks, California, USA: Sage Publications Inc, 2002: 143–84.
- Stake RE. *Multiple case study analysis*. Guilford Press, 2013.
- Miles R. Complexity, representation and practice: case study as method and methodology. *Issues in Educational Research* 2015;25.
- Elliott R, Timulak L. Descriptive and interpretive approaches to qualitative research. In: *A Handbook of research methods for clinical and health psychology*. , 2005: 1, 147–59.
- Corbin J, Strauss AL. *Basics of qualitative research*. United States of America, Thousand Oaks, California: Sage Publications Inc, 2015.
- Belotto M J. Data analysis methods for qualitative research: managing the challenges of coding, interrater reliability, and thematic analysis. *Qual Rep* 2018;23:2622–33.
- Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. *Educ Technol Res and Dev* 1981;29.
- Fink D. *What is "Significant Learning"*. San Francisco, California: John Wiley & sons, 2003.
- Vygotsky LS. Interaction between learning development. In: Cole M, ed. *Mind and society: the development of higher mental processes*. Cambridge, MA: Harvard University Press, 1978: 79–91.
- May C, Sibley A, Hunt K. The nursing work of hospital-based clinical practice guideline implementation: an explanatory systematic review using normalisation process theory. *Int J Nurs Stud* 2014;51:289–99.
- Fixsen DL, Naoom SF, Blase KA, et al. *Implementation research: a synthesis of the literature report no: 311712*. Tampa: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network, 2005.
- Ogden T, Fixsen DL. Implementation science. *Z Psychol* 2015;222:4–11.
- Mather C, Cummings E. Issues for deployment of mobile learning by nurses in Australian healthcare settings. *Stud Health Technol Inform* 2016;225:277–81.
- Nursing and Midwifery Board of Australia. Registered nurse standards for practice, 2016. Available: <http://www.nursingmidwiferyboard.gov.au/News/2016-02-01-revised-standards.aspx>