



## **Adaptive Expertise in CanMEDS 2025**

### **Expertise adaptative dans CanMEDS 2025**

Nathan Cupido, Nancy Fowler, Lyn K Sonnenberg, Anna Karwowska, Denyse Richardson, Linda Snell, Brent Thoma and Maria Mylopoulos

Volume 14, Number 1, 2023

CanMEDS 2025 Special Issue  
Numéro spécial CanMEDS 2025

URI: <https://id.erudit.org/iderudit/1099036ar>

DOI: <https://doi.org/10.36834/cmej.75445>

[See table of contents](#)

Publisher(s)

Canadian Medical Education Journal

ISSN

1923-1202 (digital)

[Explore this journal](#)

Cite this document

Cupido, N., Fowler, N., Sonnenberg, L., Karwowska, A., Richardson, D., Snell, L., Thoma, B. & Mylopoulos, M. (2023). Adaptive Expertise in CanMEDS 2025. *Canadian Medical Education Journal / Revue canadienne de l'éducation médicale*, 14(1), 18–21. <https://doi.org/10.36834/cmej.75445>

© Nathan Cupido, Nancy Fowler, Lyn K Sonnenberg, Anna Karwowska, Denyse Richardson, Linda Snell, Brent Thoma and Maria Mylopoulos, 2023



This document is protected by copyright law. Use of the services of Érudit (including reproduction) is subject to its terms and conditions, which can be viewed online.

<https://apropos.erudit.org/en/users/policy-on-use/>

## Adaptive Expertise in CanMEDS 2025

### Expertise adaptative dans CanMEDS 2025

*Nathan Cupido,<sup>1,2</sup> Nancy Fowler,<sup>3,4</sup> Lyn K Sonnenberg,<sup>5,6</sup> Anna Karwowska<sup>7,8</sup> Denyse Richardson,<sup>2,9</sup> Linda Snell,<sup>9,10</sup> Brent Thoma,<sup>9,11</sup> Maria Mylopoulos<sup>1,2</sup>*

<sup>1</sup>The Wilson Centre, Temerty Faculty of Medicine, University of Toronto, Ontario, Canada; <sup>2</sup>University of Toronto, Ontario, Canada; <sup>3</sup>College of Family Physicians of Canada, Ontario, Canada; <sup>4</sup>McMaster University, Ontario, Canada; <sup>5</sup>University of Alberta, Alberta, Canada; <sup>6</sup>Glenrose Rehabilitation Hospital, Alberta, Canada; <sup>7</sup>University of Ottawa, Ontario, Canada; <sup>8</sup>Association of Faculties of Medicine of Canada, Ontario, Canada; <sup>9</sup>Royal College of Physicians and Surgeons of Canada, Ontario, Canada; <sup>10</sup>McGill University, Quebec, Canada; <sup>11</sup>University of Saskatchewan, Saskatchewan, Canada;

Correspondence to: Maria Mylopoulos, PhD; Senior Scientist & Associate Director, The Wilson Centre, UHN - Toronto General Hospital, 200 Elizabeth Street, ES 1-565, Toronto, ON M5G 2C4; email: [maria.mylopoulos@utoronto.ca](mailto:maria.mylopoulos@utoronto.ca); [www.thewilsoncentre.ca](http://www.thewilsoncentre.ca)

Published ahead of issue: Oct 25, 2022; published Mar 21, 2023. CMEJ 2023, 14(1) Available at <https://doi.org/10.36834/cmej.75445>

© 2023 Cupido, Fowler, Sonnenberg, Karwowska, Richardson, Snell, Thoma, Mylopoulos; licensee Synergies Partners. This is an Open Journal Systems article distributed under the terms of the Creative Commons Attribution License. (<https://creativecommons.org/licenses/by-nc-nd/4.0>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is cited.

## Introduction

Adaptive expertise incorporates competencies related to the evolution, refinement, and development of the knowledge and skills required to practice and learn effectively and innovatively in a rapidly changing world. It was identified as an essential concept that was underrepresented in the CanMEDS physician competency framework in a recent literature review.<sup>1</sup> This manuscript aims to summarize the concept and its links to former and future iterations of CanMEDS.

## What is adaptive expertise and why is it important to physician competency?

Adaptive expertise is a model of expert development and performance that emphasizes a balance between the efficient and effective application of previous knowledge when facing well-known problems and the creation of new knowledge to generate solutions when previous knowledge is insufficient. In contrast, routine expertise is understood to reflect only the efficiency dimension of adaptive expertise. This balance between 'efficiency' and 'innovation' in adaptive expertise is complemented by an approach to practice that recognizes daily problem solving as an opportunity to learn and improve.<sup>2,3</sup> Thus, when facing problems for which the application of previous knowledge is insufficient, adaptive expertise enables the

flexible use of knowledge and the ability to generate new solutions while routine expertise will result in failed attempts to 'fit unknown problems to known solutions.'<sup>4</sup>

Adaptive expertise is characterized by both knowing what to do (procedural fluency) as well as knowing why you're doing it (conceptual understanding).<sup>5</sup> It is this conceptual understanding that permits adaptation to variability in novel and uncertain clinical situations i.e. if known solutions are insufficient, adaptive experts can generate new solutions that still address the underlying 'why'. To foster the development of adaptive expertise, education must shift beyond a sole emphasis on effective knowledge retention and application towards preparing students to continue to learn and generate new knowledge. This capacity has been defined as 'preparation for future learning (PFL).'<sup>6</sup>

In health professions education, pedagogical approaches that support PFL include a) explicit integration of clinical signs and symptoms with underlying mechanisms (e.g. asking or telling "why"), b) exposing students to meaningful variation (e.g. asking "what if" questions) and c) leveraging struggle and discovery in learning followed by immediate feedback and consolidation.<sup>7,8</sup> Inevitably, health professionals will face patients presenting with conditions for which they have not received formal training. Thus, the ability to create new knowledge and learn in the face of novel problems ensures that physicians are responsive to the unique needs of their patients, as well as able to

provide care within ever-changing, dynamic, interprofessional networks of healthcare workers.<sup>9</sup>

## How is adaptive expertise represented in the 2015 CanMEDS competency framework?

The Medical Expert role reflects many aspects of adaptive expertise: patient-centered clinical assessment and management; complexity, ambiguity, and uncertainty in clinical decision-making; and drawing on an evolving body of knowledge when making decisions. However, the 2015 framework lacks specific reference to adaptive expertise in relation to this role (Table 1A and 1B), which may create an environment where educators are not primed to deliberately cultivate the necessary knowledge and skills required to practice and learn effectively and innovatively. Explicitly incorporating adaptive expertise as a key Medical Expert competency in CanMEDS would highlight its relationship with medical expertise, underscore its central function to the integration of all seven CanMEDS roles in daily practice, and promote the capacity to innovate and create new knowledge in practice as a marker of professional competence and continuing professional development.

## How can adaptive expertise be better represented within the 2025 CanMEDS competency framework?

Recognizing the importance of adaptive expertise in clinical decision-making, we propose incorporating a new key competency into the Medical Expert role (Table 1C). Its enabling competencies incorporate the capacity to balance between efficiency and innovation, to embrace multiple perspectives, and to learn throughout clinical practice. By situating adaptive expertise as a key competency within the Medical Expert role, we recognize the central role of medical expertise in the CanMEDS framework and how it incorporates the intrinsic roles into one's scope of practice. Additionally, we have made minor suggestions to enabling competencies under the Communicator, Collaborator, Leader, and Scholar roles to better integrate important elements of adaptive expertise in these areas (Table 1C). From a developmental perspective, the introduction of adaptive expertise early within discipline-specific training recognizes that education that includes PFL can help ensure that sustained competence and growth in clinical decision-making is accounted for in continuing professional development. The progression from novice to mastery in the organization of CanMEDS milestones can further align with adaptive expertise to promote the capacity to innovate and create new knowledge in practice as a marker of professional competence.

Table 1. Adaptive expertise competencies for the CanMEDS physician competency framework.

A. CanMEDS 2015 Competencies directly applicable to Adaptive Expertise	
Medical Expert 1.2 Integrate the CanMEDS intrinsic roles into their practice of medicine	
Medical Expert 1.6 Recognize and respond to the complexity, uncertainty, and ambiguity inherent in medical practice	
Medical Expert 3.1 Determine the most appropriate procedures or therapies	
Medical Expert 3.4 Perform a procedure in a skilful and safe manner, adapting to unanticipated findings or changing clinical circumstances	
B. CanMEDS 2015 Competencies partially related to Adaptive Expertise	
Medical Expert 1.3 Apply knowledge of the clinical and biomedical sciences relevant to their discipline	
Medical Expert 4.1 Implement a patient-centered care plan that supports ongoing care, follow-up on investigations, response to treatment, and further consultation	
Scholar 1.2 Identify opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources	
Scholar 1.3 Engage in collaborative learning to continuously improve personal practice and contribute to collective improvements in practice	
Scholar 3.1 Recognize practice uncertainty and knowledge gaps in clinical and other professional encounters and generate focused questions that address them	
Communicator 1.6 Adapt to the unique needs and preferences of each patient and to his or her clinical condition and circumstances	
Communicator 3.1 Share information and explanations that are clear, accurate, and timely, while checking for patient and family understanding	
Collaborator 1 Work effectively with physicians and other colleagues in the health care professions	
Collaborator 1.2 Negotiate overlapping and shared responsibilities with physicians and other colleagues in the health care professions in episodic and ongoing care	
Leader 2.1 Allocate health care resources for optimal patient care	
C. Suggested additions or modifications for the CanMEDS 2025 Framework related to Adaptive Expertise	
New or Modified Competency	Rationale for change
Medical Expert	
6 (New): Adaptively balance efficient application of known solutions with innovative generation of new solutions during patient care	We propose that the explicit inclusion of adaptive expertise and related competencies in the CanMEDS 2025 framework will support educators in promoting the development of adaptive expertise in future students. These competencies reflect essential aspects of adaptive expertise which we argue are currently underemphasized or unexamined in the 2015 CanMEDS framework.
6.1 (New): Integrate multiple perspectives and CanMEDS roles in order to adaptively respond to clinical problems	
6.2 (New): Recognize the need for the flexible use of knowledge to generate new solutions when faced with novelty, uncertainty, and ambiguity	
6.3 (New): Approach daily problem solving as an opportunity to learn and create new knowledge embedded in daily practice	
1.3 (Revised): Apply integrated understanding of the clinical and biomedical sciences relevant to their discipline	This revision reflects the importance of cognitive integration for adaptive expertise. Cognitive integration refers to the deep, conceptual knowledge developed within the mind of the learner through the integration of clinical and biomedical sciences. This explicit integration of clinical signs and symptoms with underlying mechanisms prepares learners to deal with complexity and continue to learn in future practice. <sup>8</sup>
3.1 (Revised): Understand why procedures or therapies are the most appropriate for a given patient	This revision reflects that it is conceptual understanding—i.e. knowing why you’re doing what you’re doing—that permits adaptation to variation when working with the unique needs of each individual patient.
4.1 (Revised): Develop and implement a patient-centered care plan that is responsive to individual patient needs and experiences, supports ongoing care, follow-up on investigations, response to treatment, and further consultation	This revision reflects that the capacity to be ‘innovative’ is required in order to serve the unique needs of each individual patient.
Communicator	
3.1 (Revised): Share information and explanations that are clear, accurate, and timely, adapting as needed to ensure patient and family understanding	This revision reflects that the intrinsic CanMEDS roles also require adaptive expertise—the capacity to be ‘innovative’ in communication is required in order to serve the unique needs of each individual patient.
Collaborator	
1. (Revised): Work effectively with physicians and other colleagues in the health care professions to provide the highest quality of patient care	This revision reflects the capacity to work within dynamic, interprofessional networks of healthcare workers which is supported through adaptive expertise and is necessary in order to provide the highest quality of care to patients.
Leader	
2.1 (Revised): Allocate health care resources for optimally adaptive patient care	This revision reflects the imperative for ‘optimal adaptability’—a balance between innovation and efficiency—in adaptive expertise. <sup>3,10,11</sup>
Scholar	
1.2 (Revised): Identify patient care experiences as opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources	This revision reflects that training should prepare students and residents to continue to learn and generate new knowledge through daily problem solving and patient encounters.

**Conflicts of Interest:** Nancy Fowler is a paid employee of the College of Family Physicians of Canada. Lyn Sonnenberg has received honoraria for her past keynote speaking from Royal College International and the American Academy of Optometry. She is a paid employee at the University of Alberta for her scholarly and administrative work. Anna Karwowska receives a stipend from the AFMC. Linda Snell is a part-time employee of the Royal College of Physicians and Surgeons of Canada. Brent Thoma has received payments for teaching, research, and administrative work from the University of Saskatchewan College of Medicine, payments for teaching and administrative work from the Royal College of Physicians and Surgeons of Canada, honoraria for teaching or writing from Harvard Medical School, the New England Journal of Medicine, the University of Cincinnati Children's Hospital, and NYC Health + Hospitals, and research grant funding from the Government of Ontario and the Canadian Association of Emergency Physicians.

**Funding:** This project was completed with logistical support from the Royal College of Physicians and Surgeons of Canada.

**Acknowledgement:** The authors would like to acknowledge Ms. Megan McComb for planning and logistical support.

## References

1. Thoma B, Karwowska A, Samson L, et al. Emerging concepts in the CanMEDS physician competency framework. *Can Med Educ J*. 2023. <https://doi.org/10.36834/cmej.75591>
2. Mylopoulos M, Woods NN. When I say... adaptive expertise. *Med Educ*. 2017;51(7):685-686. <https://doi.org/10.1111/medu.13247>
3. Schwartz DL, Bransford JD, Sears D. Efficiency and innovation in transfer. In Mestre, JP, ed. *Transfer of Learning From a Modern Multidisciplinary Perspective*. Charlotte, NC: Information Age Publishing; 2005:1-51.
4. Hatano G, Inagaki K. Two courses of expertise. In Stevenson H, Azuma, H, Hakuta, K, ed. *Child Development and Education in Japan*. New York, NY: W. H. Freeman; 1984:27-36.
5. Lin X, Schwartz DL, Bransford J. Intercultural adaptive expertise: explicit and implicit lessons from Dr. Hatano. *Hum Dev*. 2007;50(1):65-72. <https://doi.org/10.1159/000097686>
6. Mylopoulos M, Brydges R, Woods NN, Manzone J, Schwartz DL. Preparation for future learning: a missing competency in health professions education?. *Med Educ*. 2016;50(1):115-123. <https://doi.org/10.1111/medu.12893>
7. Mylopoulos M, Kulasegaram K, Woods NN. Developing the experts we need: fostering adaptive expertise through education. *J Eval Clin Pract*. 2018;24(3):674-677. <https://doi.org/10.1111/jep.12905>
8. Mylopoulos M, Steenhof N, Kaushal A, Woods NN. Twelve tips for designing curricula that support the development of adaptive expertise. *Med Teach*. 2018;40(8):850-854. <https://doi.org/10.1080/0142159X.2018.1484082>
9. Sonnenberg LK. Digital health, learner competence, and a pandemic: the storm I had been waiting for. *Arch Med Health Sci*. 2021;9(1):12-15. [https://doi.org/10.4103/amhs.amhs\\_107\\_21](https://doi.org/10.4103/amhs.amhs_107_21)
10. Cutrer WB, Miller B, Pusic MV, et al. Fostering the development of Master Adaptive Learners: a conceptual model to guide skill acquisition in medical education. *Acad Med*. 2017;92(1):70-75. <https://doi.org/10.1097/ACM.0000000000001323>
11. Pusic MV, Santen SA, Dekhtyar M, et al. Learning to balance efficiency and innovation for optimal adaptive expertise. *Med Teach*. 2018;40(8):820-827. <https://doi.org/10.1080/0142159X.2018.1485887>