



The imperative for (and opportunities of) research on adaptive expertise in health professions education

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Abstract

In this editorial, three *Advances in Health Sciences Education* editors argue for the importance and impact of adaptive expertise on the future of health professions education and work. They present a sample of the broad range of theory-informed research currently contributing to understanding and applying adaptive expertise in health professions education. They reflect on the unique opportunities that interdisciplinarity offers this endeavour. Finally they offer potential ways forward for continued efforts to advance collective understanding of education, expert development and health professions practice.

A few years ago, during a lively discussion about adaptive expertise, one exasperated colleague finally declared, “I just don’t think we need to invent another term for expertise in the health professions”. This comment reflects broader methodological debates in the field (e.g. Albert et al., 2019) and concerns that medical education is continuously (and unnecessarily) inventing new constructs and theories rather than harnessing existing theoretical frameworks. However, in this case, we didn’t “invent another term” as the construct of adaptive expertise was not developed in the context of health professions education research (HPER). Rather, this robust theoretical framework evolved through decades of research in the learning sciences (Bereiter & Scardamalia, 1993; Bransford et al., 2000; Bransford & Schwartz, 1999; Hatano & Inagaki, 1986; Hatano & Oura, 2003; Schwartz et al., 2005).

Adaptive expertise has broadly been defined as the development and performance of both efficient (applying known solutions) and innovative (generating new solutions) dimensions of expertise. These dimensions of expert work are not seen as competing, but rather as complementary and balanced, and their performance is driven by contextual demands. We

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see the relatively recent emerging interest and exploration of adaptive expertise in the health sciences education literature as an example of integrating a construct from the ‘outside’ in a way that resonates with researchers, educators and clinicians because it addresses contemporary educational concerns. As such, for researchers in HPER to meaningfully elaborate the construct, we need theory-informed inquiry that is directly relevant to the specific research and practice contexts of HPE. In doing this theory-oriented work, we enrich our understanding of health professions education while contributing to, and learning from, the rich literature on expert development in higher education and professions education more broadly. In the interdisciplinary research space of HPER, this endeavour is a powerful opportunity to bring our diverse perspectives, theories, and methodologies to bear on an established construct that has the potential to impact the future of healthcare education and work. As the editors for this special issue, we would argue our contributing authors have taken full advantage of this opportunity.

This special issue

Given the dynamic and increasingly complex health care workplace, it is imperative that health professionals have the capacity to adapt. Today’s clinicians must be prepared to meet the challenge of a constantly evolving work environment, including solving novel problems and handling ambiguous and complex situations. The theoretical framework of adaptive expertise helps us understand and explore how this challenge can be met. The ten papers in this special issue demonstrate that adaptive expertise is of interest to a diverse group of scholars seeking a better understanding of the framework and how it can inform education practice.

In some instances, the authors have focused on clarifying the use of the term *adaptive expertise*. They have recognized a need to refine the terminology and understanding of adaptive expertise to ease the application of the existing and growing literature to advance health professions education and practice. Cupido and colleagues (2022) conducted a scoping review of how adaptive expertise has been discussed in the HPE literature. They have identified and sought to remedy a lack of conceptual clarity around adaptive expertise in HPER that they have argued might impede the effective application of the framework in education practice. Along similar lines, identifying the misalignments that can occur across disciplines, Pelgrim, Hissinck and colleagues (2022) worked to clarify the concepts of adaptive expertise and adaptive performance across disciplines. Their paper highlights the idea that adaptive performance can be understood as the visible expression of adaptive expertise, and that it is mitigated by individual, task and environmental characteristics.

Although misalignments are an inherent peril of interdisciplinarity, working across disciplines also affords the opportunity to see synergies in otherwise disparate theoretical traditions. Ng et al., (2022) explored the potential alignment of adaptive expertise and critical reflection, noting that they are theoretical frameworks that stem from different literatures but which nevertheless have clear synergies that can be productively harnessed. Applying the framework of adaptive expertise to motor learning, Dall Jensen et al., (2022) considered the performance of precision technical skills through the lens of adaptive expertise and challenge the notion of ‘routine’ in motor skill performance. Based on a review of the literature they argued that motor movements are not routine, but rather require constant adaptation,

and that repetitive practice is much less repetitive than often perceived. Reflecting on how heavily implicated transfer of learning is well-established in research on adaptive expertise elsewhere (e.g. Schwartz et al., 2005; Schwartz et al., 2012), Cheung et al. (2022) reviewed mechanisms of transfer in adaptive expertise and more traditional accounts of transfer. They posited that the resulting commonalities can provide instructional principles for supporting both transfer and adaptive expertise.

Another set of papers focused on the importance of building understanding of adaptive expert development and performance in the workplace. Much of the seminal literature on developing adaptive expertise has focused on the activation of cognitive and social learning mechanisms in structured education environments. As understanding of the particular capabilities that underpin adaptive expertise in HPE continues to evolve, researchers are foregrounding the importance of understanding how cognitive activity is enacted in a particular context and therefore shaped by the affordances and barriers of those contexts. In this issue, Gambourg and colleagues (2022) explored how clinical supervision in the workplace can impact the development of adaptive expertise. Their study provides an account of how principles of instruction for adaptive expertise often utilized in classroom environments are enacted and transformed in two Danish emergency departments. Lynch et al., (2022) explored learners' experiences of 'challenging conversations' in a developmental paediatrics hospital in Canada. They characterized the ways in which learners can take advantage of challenging clinical experiences to further the development of adaptive expertise through productive failure in a safe environment (Kapur, 2014; Steenhof et al., 2019, 2020) and how these opportunities are frequently missed because supervisors tend to protect learners in the workplace. By exploring this question in the context of developing adaptive expertise in communication they also remind us that the implications of adaptive expertise are not limited to the medical expert competency domain, but can inform understanding of performance and development across competency domains (Mylopoulos et al., 2012; Sklar, 2013). The paper by Kua and colleagues (2022) explored how adaptive experts in healthcare continue to learn as they work, which has been previously elaborated as a core capability of adaptive expertise (Mylopoulos et al., 2016; Schwartz & Martin, 2004). In the context of geriatric care in a tertiary care hospital in Singapore, they explored interactions at the intra-personal, inter-personal and organisational levels and characterize the learning experiences of adaptive experts.

It is crucial that as part of our HPE focused lens on adaptive expertise that we consider ways to meaningfully advance the broader understanding of the construct in ways that build upon the research in the cognitive and learning sciences. While that research has largely focussed on individual adaptive expert performance, Cristancho et al., (2022) argued that understanding how adaptive expert teams develop and perform is also needed for adaptive expertise to meaningfully impact health care work. They explored how teams handle the inevitable disruptions of the workplace across diverse professional contexts and highlighted the importance of interchangeability in fluid teams. Their study is an example of taking a new perspective on a well-understood concept while remaining true to the extant theoretical framework of adaptive expertise.

Ultimately, the goal of research in health professions education is to meaningfully impact education and work in health professions education. Pusic et al., (2022) have demonstrated how the theoretical framework of adaptive expertise, and in particular the research conducted with a specific HPE lens, can be implemented across the continuum of health profes-

sions education. They provided case studies from the United States across different contexts and levels of development and drew out common themes. In doing so, they have illustrated that successful implementation of strategies to cultivate adaptive expertise requires flexibility and customization to meaningfully impact the learning trajectories of experts and future experts. They remind us that implementing evidence-based education is not about implementing a signature pedagogy, but rather about ensuring that education is aligned with chosen principles of learning (Cianciolo & Regehr, 2019).

Collectively, the papers in this special issue offer a powerful demonstration of a full cycle of evidence-based education. They showcase the value of systematic exploration of theoretical framework through scholarly inquiry. The papers in this issue remind us that adaptive expertise is developed and performed in both classrooms and in the 'wild' (Hutchins, 1995). A comprehensive understanding of adaptive expertise must harness the interdisciplinarity of our field to foreground and understand the interplay between cognition and context as a core component of the development and performance of adaptive expertise. As the papers in this special issue clearly demonstrate, combining research from different perspectives (in order to account for both cognitive processing and the context of activity) enhances theory building and provides educators across the continuum of education with the evidence they need to impact the future of work in the health professions.

Future research

To us, the papers presented in this special issue remind us that progression in science means conversations and explorations that bridge perspectives rather than constructing oppositions (Newell, 1973). As such they forgo the construction of oppositions through proliferation of phenomena in favor of rich investigations that advance our collective understanding of education, expert development and health professions practice.

They also make very apparent the need for further research. We need to continue to expand our investigations to better understand why and under which conditions adaptive expertise can be developed and performed. This will require work to further elucidate the broad range of research findings and perspectives presented in this special issue. Having had the opportunity to edit this special issue, we have already generated numerous questions (e.g. how much variability in context is needed to develop adaptive expertise? How do we ensure our learners can struggle productively and safely across the continuum of education? How can we support the development of adaptive expert teams? Do health care organizations support adaptive expertise for all professionals? What role does collaboration play in adaptive expertise?).

Advancing the study of adaptive expertise will require continued, intentional effort to integrate knowledge and methodologies across research traditions. While we know this integration can be complicated (Albert et al., 2020; Martimianakis & Albert, 2013; Ellaway et al., 2020), the work is most certainly worthwhile and it's our hope that more future research in the field will continue along these lines.

References

- Albert, M., Mylopoulos, M., & Loberge, S. (2019). Examining grounded theory through the lens of rationalist epistemology. *Advances in Health Sciences Education*, 24(4). <https://doi.org/10.1007/s10459-018-9849-7>.
- Albert, M., Rowland, P., Friesen, F. & Loberge, S. (2020). Interdisciplinarity in medical education research: myth and reality. *Advances in Health Sciences Education*, 25(5), 1243–1253. <https://doi.org/10.1007/S10459-020-09977-8/FIGURES/2>.
- Bereiter, C. & Scardamalia, M. (1993). *Surpassing Ourselves: An Inquiry into the Nature and Implications of Expertise*. Open Court.
- Bransford, J. D., Brown, A. L. & Cocking, R. R. (2000). *How People Learn*. National Academy Press.
- Bransford, J. D. & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of Research in Education*, 24 1999 (24 vol., pp. 61–100). American Educational Research Association.
- Cheung, J. J. H. & Kulasegaram, K. M. (2022). Beyond the Tensions within Transfer Theories: Implications for Adaptive Expertise in the Health Professions. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10174-y>.
- Cianciolo, A. T. & Regehr, G. (2019). Learning Theory and Educational Intervention: Producing Meaningful Evidence of Impact Through Layered Analysis. *Academic Medicine*, 94(6), 789–794. <https://doi.org/10.1097/ACM.0000000000002591>.
- Cristancho, S., Field, E., Lingard, L., Taylor, T., Hibbert, K., Thompson, G. & Hibbert, W. (2022). Ecological Interchangeability: Supporting team adaptive expertise in moments of disruption. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10160-4>.
- Cupido, N., Ross, S., Lawrence, K., Fowler, N., Hess, B., van der Goes, T. & Schultz, K. (2022). Making sense of adaptive expertise for frontline clinical educators: A scoping review of definitions and applications. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10176-w>.
- Dall Jensen, R., Brydges, R. & Grierson, L. (2022). Re-examining the integration of routine and adaptive expertise: There is no such thing as routine from a motor control perspective. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10163-1>.
- Ellaway, R., Tolsgaard, M. & Martimianakis, M. A. (2020). What divides us and what unites us? *Advances in Health Sciences Education*, 25(5), 1019–1023. <https://doi.org/10.1007/S10459-020-10016-9/FIGURES/1>.
- Gambourg, M. L., Dall Jensen, R., Musaeus, P. & Mylopoulos, M. (2022). Balancing closure and discovery: Adaptive expertise in the workplace. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10177-9>.
- Hatano, G. & Inagaki, K. (1986). Two Courses of Expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child Development and Education in Japan*. W.H. Freeman.
- Hatano, G. & Oura, Y. (2003). Commentary: Reconceptualizing School Learning Using Insight From Expertise Research. *Educational Researcher*, 32(8), 26–29.
- Hutchins, E. (1995). *Cognition in the Wild*. MIT Press.
- Kapur, M. (2014). Productive Failure in Learning Math. *Cognitive Science*, 38(5), 1008–1022. <https://doi.org/10.1111/cogs.12107>.
- Kua, J., Teo, W. & Lim, W. S. (2022). Learning experiences of Adaptive Experts - a Reflexive Thematic Analysis. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10166-y>.
- Lynch, J., Orsino, A. & Kawamura, A. (2022). Productive struggle and failing safely: implications for developing adaptive expertise in communication. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10175-x>.
- Martimianakis, M. & Albert, M. (2013). Confronting complexity: medical education, social theory and the ‘fate of our times.’. *Medical Education*, 47(1), 3–5. <https://doi.org/10.1111/MEDU.12086>.
- Mylopoulos, M., Lohfeld, L., Norman, G. R., Dhaliwal, G. & Eva, K. W. (2012). Renowned Physicians’ Perceptions of Expert Diagnostic Practice. *Academic Medicine*, 87(10), 1413–1417.
- Mylopoulos, M., Brydges, R., Woods, N. N., Manzone, J. & Schwartz, D. L. (2016). Preparation for future learning: a missing competency in health professions education? *Medical Education*, 50(1), 115–123. <https://doi.org/10.1111/medu.12893>.
- Newell, A. (1973). You can’t play 20 questions with nature and win: projective comments on the papers of this symposium. *Machine Intelligence: Perspectives on the Computational Model*, 283–308. <https://doi.org/10.1016/B978-0-12-170150-5.50012-3>.
- Ng, S. L., Forsey, J., Friesen, F., Langlois, S., Ladonna, K., Mylopoulos, M. & Steenhof, N. (2022). Combining Adaptive Expertise and Reflective Practice to Support the Development of Knowledge, Skill, and Society. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10178-8>.

- Pelgrim, E., Hissink, E., Bus, L., Van Der Schaaf, M., Nieuwenhuis, L., Van Tartwijk, J. & Kuijer- Siebelink, W. (2022). Professionals' adaptive expertise and adaptive performance in educational and workplace settings: an overview of reviews. *Advances in Health Sciences Education*. (under review)
- Pusic, M., Hall, E., Billings, H., Hopson, L., Regan, L., Gisondi, M. A. & Cutrer, W. B. (2022). Educating for adaptive expertise: Case Examples along the Health Professions Education Continuum. *Advances in Health Sciences Education*. <https://doi.org/10.1007/s10459-022-10165-z>.
- Schwartz, D. L., Bransford, J. D. & Sears, D. (2005). Efficiency and innovation in transfer. In J. P. Mestre (Ed.), *Transfer of learning from a Modern Multidisciplinary Perspective* (pp. 1–52). Information Age publishing.
- Schwartz, D. L., Chase, C. C. & Bransford, J. D. (2012). Resisting Overzealous Transfer: Coordinating Previously Successful Routines With Needs for New Learning. *Educational Psychologist*, 47(3), 204–214. <https://doi.org/10.1080/00461520.2012.696317>.
- Schwartz, D. L. & Martin, T. (2004). Inventing to prepare for future learning: The hidden efficiency of encouraging original student production in statistics instruction. *Cognition and Instruction*, 22(2), 129–184.
- Sklar, D. (2013). Integrating Competencies. *Academic Medicine*, 88(8), 1049–1051.
- Steenhof, N., Woods, N. N., Van Gerven, P. W. M. & Mylopoulos, M. (2019). Productive failure as an instructional approach to promote future learning. *Advances in Health Sciences Education*, 24(4). <https://doi.org/10.1007/s10459-019-09895-4>.
- Steenhof, N., Woods, N. N. & Mylopoulos, M. (2020). Exploring why we learn from productive failure: insights from the cognitive and learning sciences. *Advances in Health Sciences Education*, 25(5), 1099–1106. <https://doi.org/10.1007/S10459-020-10013-Y/TABLES/1>.

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