A Research-based Framework for Defining & Developing Expertise in Your Health Sciences Specialty

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Learning Objectives

- Participants will recognize the research-based conceptual elements and applied principles of expertise development across professions

- Participants will consider how the elements of expertise development are reflected in their own professional expertise and the expertise of colleagues.

- Participants will see how the principles of expertise development can help identify key elements of expertise in health sciences generally and in their specialty field.

- Participants will see how the principles of expertise can be useful to address gaps in student expertise, and to support development for their students

Where We Are Going

- Where this information comes from
- Why we need to define & develop expertise
- Research-based concepts & principles of theory & practice
  - What expertise is & isn't
  - How to define it
  - How to develop it
- **Challenge:**
  - consider your own expertise development
  - your junior colleagues' & mentees' expertise development
  - your students' expertise development

Where This Information Comes From

- Decades of research on expertise across professions & contexts
  - Books & articles identifying general & specialized elements of expertise
  - Fields of: medicine, flight, software design, music, sports, math, chess . . .
- Research has provided clarity on
  - Characteristics of experts—the product
  - Development toward expertise—the process
- My own years of studying expertise
  - in medicine, nursing, engineering, instructional design, dance . . .
  - Demonstrating much about the nature & dynamic of expertise development

Need—Defining Expertise

- "Education is not the learning of facts, but the training of the mind to think" (Einstein)
- We select best candidates with potential to become experts
  - Give them foundational knowledge & build technical skills
- They will graduate into a rapidly-changing field of practice
  - Need strategic capacity to continue developing throughout careers
- We are pushed to codify competencies, establish accountability
  - Yes, we must know what benchmarks competent professionals
  - But competencies focus on what we know now
  - Expertise looks into future

Shared Needs

- I teach graduate students in instructional design
  - Creating learning spaces & opportunities for anyone, anywhere
- This field & demands it presents are constantly changing
  - Student prepared to develop career-long expertise will meet those demands
  - Design for any learner group, content & context, delivered in tech not yet created
- One unprepared may work 20+ years & never develop expertise
  - Keep doing the same things, the same way, become outdated or fear change
- I have to prepare designers with foundations & capacity to solve problems that don't exist yet
- As I understand it, you have the same challenge in health care professions

Need—Developing Expertise 1

- "I never teach my pupils, I only provide the conditions in which they can learn" (Einstein)
- Will not always be there. If students depend on us for answers, they will stagnate
  - If we provide conditions, teach them to think and learn, then they can learn forever
- Using research-based principles
  - Provide conditions so they can leverage every bit of their capacity
- Cannot produce experts overnight
  - Can give them foundations to build expertise throughout their careers

Need—Developing Expertise 2

- Understanding expertise development also illuminates ways WE can keep learning & embrace change

- I know that many of your are dedicated to lifelong learning
  - These principles are tools to help you do that

- Experts in intercollegial projects need both convergent (generalizable) and divergent (domain-specific) knowledge & expertise

- Experts in different roles (ex. physicians, nurses, technical specialists) in same clinical area share goals & domain-area expertise, but require highly-specialized, task-related expertise to achieve high-quality patient care

- Success depends on integration of different types & levels of expertise

Expertise is NOT

- Just more Esoteric knowledge

- *Just s*ame technical skills done faster

- Dealing well only with most common scenarios

- Lots of practice with the same skills & conditions

- Doing task well only when all goes right/as planned

  - Really good at procedures that go well, but confounded when go wrong

  - Not same level of expertise as one who can rapidly problem-solve & put task back on course

Expertise IS

- Integration of knowledge, skills and abilities
  - **Cognitive & Metacognitive** (knowledge, awareness, "vision" of workspaces)
  - **Technical & Applied skills** (motor/psychomotor, practical, lab & clinical tasks)
  - **Social, Affective, Perceptual** (stress, identity development, communication)
- Critical skills done efficiently & accurately (quality work)
- Adaptivity—across cases, conditions, contexts, needs, change
- Range of perspective—across space & time, actual & possible
- Rapid, Informed Reasoning that supports critical decision-making
- Knowing how *plus* when, where & why to use tools & procedures

Expertise IS Also

- Capacity & strategies for dealing with stressors

- Teachable attitude (humility)—receptive to critique, sees learning & change as strengths, not weakness

- Reciprocal Process & Product of neurological development
  - Building capacity & more complex neural connections through diverse experiences

- Beyond competence--building on it,
  - positioning competent professionals for lifelong development,

- Metacognitive reflection—monitoring skills & gaps, to keep growing

- Being prepared to deal with what is coming in the field

Levels of Expertise

- Generalizable (shared across fields/disciplines)

- Domain/field-specific (particular to field/specialization)

- Task-specific (particular to task/type of case)

- Will focus on two types today, combining the last 2

- Need to think about ALL 3 types developing in students

What Do We Know?

- Before we go on, let's check & see how we are doing so far.
- Would a few of you volunteer to answer these questions?

Questions:

- What is one reason we need to define expertise in our fields?
- What is one reason we need to develop expertise in our students?
- What are a few things that expertise is NOT?
- What are a few things that expertise IS?

Levels of Expertise—Examples

- A few non-medical examples—levels & transfer of expertise

- Any sports fans?
  - Tim Tebow was in pro football (impressive achievement—both types of expertise)
    - Moved to pro baseball & hit homerun first at-bat (ESPN)
  - People spend lifetime working to do *either one—he did both*
    - Great example of leveraging general expertise across sports (identify those?)

- Arts & Music Lovers?
  - Orchestra concert—saw members play magnificently on 3 different instruments
  - John Mellencamp—guitarist, singer, songwriter & also accomplished painter (NRMHF)
    - Excelled in very different arts, used both shared & unique expertise

- Police work
  - All must know how to use weapon—expert knows how NOT to use it   (ret. Career PO)

Generalizable Expertise

- Medical examples (just a few of many)
  - Critical reasoning (cognitive)
  - Manual dexterity (skill)
  - Communicating (social)
- These operationalize differently in each specialty
  - Critical reasoning—diagnosing & treating range of conditions
  - Dexterity—inserting different lines into various pathways & orifices, cutting straight & sewing neatly & securely (opening & closing things)
  - Communicating—with colleagues, patients, families, students
- Most needed any time outside of your comfort zone
  - Rotating, covering, consulting, any crossover roles
  - Any interprofessional collaboration—finding common ground

Domain & Task Expertise

- Unique/emphasized in your health science area—ex.
    - Treating every type of case that occurs uniquely in your professional area
    - Doing a task with varied methods & tools as available (often newer technology)
    - Treating rare type of condition or treating patients with particular needs, nursing in specialized surgery/care
    - Most needed in high-demand conditions, aberrant & unusual cases
        - when unexpected occurs, or resources are limited so adaptation is critical

Drilling Down to Detail

- Now that we have some basic concepts, let's drill down to more detail

- Some characteristics have been found in experts in every field
  - These are worth considering as benchmarks of expertise that translate in our fields

- We will look at just a few, to illustrate the nature of expertise

- Also look at it in contrast to non-expert knowledge, skill & reasoning

- ***As we look at these components, consider how they look in your specialty***

Key components of expertise 1

Adaptivity— major identifier of expertise in any profession

- Adaptive <u>response to change</u>—expected & unexpected

- Ability to identify & adapt to <u>aberrant events</u>, in-progress, modify process & problem-solve to address emergent needs

- Responding fluidly not only to common cases & events, but to <u>uncommon cases</u> as well

- <u>How do we promote Adaptivity?</u>

  - Expose students to widest range of authentic cases & conditions

  - Give them opportunity to expect the unexpected

Key components of expertise 2

Range of Perspective—breadth & depth—another key identifier of expertise

- Expert has Global view of workspace & relevant events—in space & time
  - "God's eye view"—aware of actions of all players, members of team simultaneously
  - Visualizes hidden problem space (anatomy)
  - Perceives & tracks events across time—real and potential
  - Tracks planned task & thinks many steps ahead
  - Anticipates what *might* occur, go wrong, change, with solutions
- Look at Comparison of Expertise on Perspective (next slide)

- How do we Promote Range of Perspective?
  - Space—Do "think-aloud" activities including increasing scope of awareness
  - Time—Ask "What if . . ." questions, to enhance scope of possible events

Comparing Range of Perspective

Novice	Competent	Expert
• Concentrates on current task, only own responsibilities • Narrow view of workspace, focused on immediate area (blinders) • Needs & expects cues from others of change from plans • May know next step, but not more than one step • Limited vision of anatomy & if internal, only normal	• Short view of planned events—2-3 steps • Sees self & immediate surroundings • Concentrates on planned activities • Manages external (visible) space better than internal (hidden) • Aware of basic structures, generally normal, less for abnormal	• Global view of workspace & events—in space & time • Aware of actions of all team members • Visualizes hidden problem space (anatomy) • Tracks events across time—real & potential • Tracks planned task & thinks ahead • Anticipates what *might* go wrong, with solutions

Key components of expertise 3

- **Trajectory of Experience & (Commensurate) Pattern of Errors**
    - Expert
        - Full range of skills, not just common but uncommon
        - Fluid skill from wealth of practice
        - Makes few errors, catches & corrects them easily
        - Manages stress well

    - How do we Reduce Errors & Promote Stress Management
        - Continuous, repeated practice across authentic range of conditions
        - Expose to stressful situations with coaching to cope with stress

Comparing Range of Experience & Errors

Novice	Competent	Expert
• Knows procedures, but hasn't used them much • Not refined, quite rough in practice • Lacks awareness of probable errors • When errors occur, needs help to identify, recognize & move to remediate • Nearly always needs help to remediate effects of errors • Significantly effected by stress, creates confusion & inhibits performance	• Solid on basic skills • Practiced & smoothed out most rough spots • Aware of & may avoid most frequent errors • When errors occur, may miss them • Often needs assistance to remediate for errors • Often needs "bailout" from expert • Some capacity to cope with stress, but it still may escalate	• Full range of skills, not just common but uncommon • Fluid skills from wealth of practice • Makes few errors • Tends to catch errors & remediate quickly • Corrects effectively so least damage occurs • Manages stress well, doesn't allow it to escalate to inhibit performance

Developing expertise 1

- So, where does expertise develop from?

  - Explicit & implicit factors: intentional & unintentional, formal & informal

  - Those provided by environment & those sought out purposefully by learners

- What can we explicitly provide to help it develop?

  - Extensive practice encompassing full range of possible variations (cases & contexts)

  - Practice managing unexpected, use rapid informed reasoning

  - Opportunities to encounter tough situations while we have their backs

  - Give them performance-attentive feedback on strengths & weaknesses

- What does it do for learners that impacts their performance?

  - Builds more complex neural synapses, access routes to richer information, supporting utilization in professional practice

  - Positions them for lifelong learning & development

Developing expertise 2

- Doing & trying everything is best, but sometimes it's not available—what then?

- Doing everything possible is optimal.
  - But If can't DO worst case, see it done (expert modeling)
  - See importance of adaptive skills-in-practice

- Making mistakes & having to work through them & recover is optimal.
  - Next-best: seeing experts make mistakes & recover, encounter tough problems & solve them—develop perceptions, expectations & values that serve as foundations for expertise development

- Feedback on experiences & performance is a powerful tool for development
  - needs to balance validation of existing skills & improving them
  - balance encouragement w/ critique, so they aspire to higher-level skills;
  - building confidence w/ correcting errors & misconceptions

Challenge for Teachers & Mentors

- Recognizing Developmental Trajectory
  - Helps building learners' competence
  - Gives give them future targets of expertise to aim for
  - Helps you track full range of change & development
- Illustrated with General Skills & Given Principles for Domain Skills
  - Challenge you to take back & practice on domain & task skills
  - Codify competencies—what you have to do
  - Also include positioning for expertise development—what they need to succeed for a lifetime

Questions?

Thank you for your attention & I hope you take these ideas back & use them to improve health professions education.