"How Learning Works"
Some fundamentals that can improve all learning, research, teaching & professional communications.

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Intro

• Learning happens in all professional and academic interactions.
• Facilitating learning is a distinct form of expertise.

• Objectives: we hope you can ...
  – Apply 4 fundamental characteristics of learning to enhance professional or academic communication and teaching.
  – Recognize how facilitating learning (‘teaching’) involves expert knowledge and skills that can be learned.
  – Be inspired to look into the precedent & literature about learning – teaching – novices & experts – etc.

Who benefits

• In what professional or academic settings does “learning” of ANY kind happen?
• Think – pair – share

• Examples:
  – Determine scope of a project with a client
  – Presenting a seminar
  – Discuss a research challenge with peers

Why fundamentals?

• We all refer to fundamentals when puzzled.
• Fundamentals & theory are needed to react in new situations.
• Examples:
  o In a statistical analysis ... results NOT as anticipated ... ☹️
    ➔ Revert to fundamentals
  o Assumptions: N big enough? Populations have a ‘normal distributions’? Etc.
  o Methods: algorithm was correct? Choice of T or ANOVA was appropriate?

• Learning examples:
  o Students all do poorly on test ... ☹️
  o Or, colleagues respond as if you never spoke ...
    ➔ .... What fundamentals to consider?
Fundamentals of learning?

• Suggest examples of “universal” (as you see it) fundamental notions about learning?
• Think ... share
  – Eg: learning involves practice ...
  – ...
  – ...
  – ...

Primary inspiration for most of this hour:
*How Learning Works: 7 research-based principles for smart teaching.* Referenced later.

Fundamentals we’ll explore

1. Prior knowledge
2. Motivation
3. Experts vs novices
   – Knowledge: how its organized, accessed, applied ...
   – Developing “mastery” (and some implications).
4. Practice & feedback
   – Briefly

1. Prior knowledge

Preconditions for changing the brain (i.e. *learning*):

– **Activated**: Is prior knowledge accessible?
  • Eg. “transfer” from one setting to another
– **Sufficient**: Is there *enough* to proceed?
– **Appropriate**: Is it *aligned* with particular needs?
  • Eg. “common usage” of terms in “technical” settings
  • Eg. Writing skills based on “creative writing” courses.
– **Accurate**: No *misconceptions* or gaps?

Prior knowledge:

**WHEN ...**
- Activated
- Sufficient
- Appropriate
- Accurate

**WILL HELP**
- Learning

**WHEN ...**
- Inactivated
- Insufficient
- Inappropriate
- Inaccurate

**CAN HINDER**
- Learning

Implications?
- Your thoughts? Examples?
- If no learning, check prior knowledge.
- TEST for prior knowledge.
- Foster access to, & assessment of, P. K.
2. Motivation

Three dimensions:

* Value what is to be learned
* Have sufficient self confidence (self efficacy)
* Be in a supporting environment

Implications?

* May need to actively foster “value” (eg in Calc101!)
* Assess & support self efficacy (diversity issues, etc.)
* Other implications?

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3. Novices vs. experts

* Most fundamentals boil down to distinctions between expert and novice behavior.
3. Novices vs. experts

- What behaviors distinguish experts & novices?
  - think – pair – share

- Examples
  - Complex work is ‘effortless’ & ‘automatic’.
  - Path forward is “obvious” or has distinction options.
  - “Unconscious” competence.
  - Can “transfer” skills/knowledge to new settings.

Effortless? Automatic?

- Experts use complex combinations of skills, assumptions, cognitive “leaps” etc.

- Driving is one example
  - Talking while driving in the city ...?

- Expert cook’s instructions are another
  - “sauté until done... “

Attaining “mastery”

- Are experts unconscious of their competence?
- Are novices conscious of their incompetence?

- Elements of mastery
  - Acquire component skills
  - Practice integrating components
  - Know which/when to apply skills
  - Transfer to new settings

- Which is emphasize at school?

Novice/experts ... implications

- Expert blindness = loosing awareness of your own expertise.

- Do experts = best teachers?
  - Not without pedagogic expertise.

- Expert task deconstruction
  - Conscious, careful deconstruction of steps.
  - Often very helpful for teachers, consultants, etc.

- Frameworks for knowledge
  - A key for courses, lessons or professional communications.
  - How do you (experts) “hook” your skills / knowledge together?

What is our framework for “how learning works” .... ???
Other examples of expertise?

• Your example of effortless expertise compared to struggling novices.
• Can you recognize issues related to
  – Unconscious competence of an expert?
  – Unconscious incompetence of a novice?
  – Expert’s assumptions?
  – The framework experts use that novices need?

Fundamentals we’ve explored

1. Prior knowledge:
2. Motivation:
3. Experts vs novices
   – Knowledge organization, access and application
   – Developing “mastery” (and some implications)
4. Practice & feedback
5. Other aspects can be related to these.

4. Practice and feedback;
   Moving towards expertise ...

• Practice does make perfect ... but learning takes time.
• How to “work smarter”, not just “more”?
• **Goal-directed practice coupled with targeted feedback.**
• **Obvious?** Maybe, but many research-based strategies can be used.
• Hence: “Discipline-based pedagogic expertise”

Time & knowledge frameworks

• More novice / expert distinctions;
  – Expert knowledge chunking
  – Novices struggle to attach “pieces” to purposes
  – Hence lectures can resemble a “fire hose ...”
• Frameworks help “coordinate” new ideas.
Inter-related concepts

- Prior knowledge ...
- Motivation ...
- Experts vs novices ...
- Practice & feedback ...

... are all in play when communicating, teaching or learning.

End with a professional communication example

Meet with UBC Legal Counsel regarding a project proposal involving contractual relationship with a Central Asian institution.

- What was relevant?
- What slowed the pace of communication?
  - Prior knowledge & assumptions
    - His assumptions about our intentions and needs as geoscience professionals and educators
    - My prior assumptions and understanding - including misconceptions
  - Motivation
    - If the project was not an exciting opportunity I would not be going within a mile of this conversation.
    - ALSO, salient points would NOT remain as useful concepts in my knowledge.
  - Novice-expert issues
    - His legal expertise and my novice perspective.
    - Framework: Their document containing 1) project requirements, 2) potential risks to workers and institutions, 3) potential mitigations, 4) options or alternatives.
  - Practice? Feedback? To gain more "expertise"?
    - Would require deliberate practice and attention, with conscious check points, self-assessments, feedback from experts and a spiral notion of moving forwards.
    - BUT - perhaps I won't go there ...

Thanks all ... 😊

Resources and references handed out.
Questions?
Suggestions?

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Always available to “consult”; EOS-South, rm361.

How learning works

Components in each of 7 chapters
- Contexts; two short scenarios
- What’s going on in each?
- What principles of learning are at work?
- What does research say about these principles?
  - Subsections ...
  - Implications of that research
- What strategies does research suggest?
  - Subsections ...
- Summary

Also 8 specific appendices with concrete recommendations