How We Learn: Implications for teaching...

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How We Learn: Implications for teaching…

Declaration:
No conflicts of interest related to this presentation
Objectives

Upon completion of this session the participant will be able to:
- Describe the modal model of learning.
- Recognize limitations of working memory.
- Analyze their own learning methods.
- Briefly describe the development of expertise.
Ground rules…

- Opportunity to learn from each other
- Interrupt when you have questions
  - chances are someone else has the same
- A dumb question is one that was **not** asked
- everyone participates
  - I tend to pick on the back row by the way
Summary

- Learning is an active process
- Knowledge is constructed
  – not transferred!
- Learning relies on prior knowledge
- Working memory is limited in size
- Importance of *Metacognition*
Objectives

Upon completion of this session the participant will be able to:

– Define learning
– Describe the modal model
– Recognize limitations of working memory
– Analyse their own learning methods
– Describe briefly the development of expertise
What is Learning???
Cognitive Psychology

• Basic principles
  – Information better retained if related to something you know
  – Importance of context
  – Better retention if organized structure
  – People are selective about what they learn
  – Meaning is constructed by the learner
    • Can’t simply transfer knowledge
  – Learners must be actively involved
The procedure is actually quite simple. First you arrange items into different groups. Of course one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important but complications can easily arise. A mistake can be expensive as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is part of life. (Bransford & Johnson, 1972, p. 722)
Cognitive Psychology

• Basic principles
  – Information better retained if related to something you know
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Learning Pyramid

- Lecture: 10%
- Reading: 20%
- Audiovisual: 30%
- Demonstration: 50%
- Discussion: 75%
- Practice doing: 90%

Source: National Training Laboratories, Bethel, Maine
Farhan: "May I be excused? My brain is full."
Modal Model

- Memory divided into 3 components
  - Sensory register
  - Short-term (working) memory
  - Long-term memory
Sensory Register

• Stores info “as is”
• Visual or auditory info
• Short duration
• Improved retention – pay attention
Short-term / Working Memory

- 49,383 divided by 59
  - Try it in your head

- Why is it not possible??

- Properties of working memory
  1. Limited capacity (7+/−2 items)
  2. Short duration
Short-term / Working Memory

- Articulatory loop

- Visual spatial sketchpad

- Can reduce load by:
  - Automaticity
  - Representations
Long-term Memory

- Long duration
- Unlimited capacity
  - More info stored - easier to learn
- Interconnections
Long-term Memory

- Declarative knowledge
  - Semantic
  - Episodic
- Procedural knowledge
- Conditional knowledge
Long-term Memory: Declarative knowledge

- Rehearsal (rote learning)
  - Difficult to do & more easily lost
- Meaningful learning
- Deep processing
- Organization
- Elaboration
- Visual imagery
Factors affecting retrieval

- Multiple connections with knowledge
- Learn to mastery and beyond
- Frequent use of knowledge
- Relevant retrieval cues
Metacognition

• Knowledge that students have about their own thinking
• Ability to use this awareness
• Want to produce learners who are:
  – Self-directed
  – Strategic
  – Reflective
What is adult learning?

- Needs to be active
- Experience based
- Based on problems/challenges
  - Choose an appropriate level
- Opportunity to apply learning
- Student-centred
- Positive learning environment
- Built-in feedback
THE KOLB LEARNING CYCLE:

AN EVENT

Retry the experience

You think about it

Learn more about it

CONCRETE EXPERIENCE

ACTIVE EXPERIMENTATION

REFLECTIVE OBSERVATION

ABSTRACT CONCEPTUALISATION
Value of Debriefing during Simulated Crisis Management

Oral versus Video-assisted Oral Feedback


Background: The debriefing process during simulation-based education has been poorly studied despite its educational importance. Videotape feedback is an adjunct that may enhance the impact of the debriefing and in turn maximize learning. The purpose of this study was to investigate the value of the debriefing process during simulation and to compare the educational efficacy of two types of feedback, oral feedback and videotape-assisted oral feedback, against control (no debriefing).

Methods: Forty-two anesthesia residents were enrolled in the study. After completing a pretest scenario, participants were randomly assigned to receive no debriefing, oral feedback, or videotape-assisted oral feedback. The debriefing focused on nontechnical skills performance guided by crisis resource management principles. Participants were then required to manage a posttest scenario. The videotapes of all performances were later reviewed by two blinded independent assessors who rated participants' nontechnical skills using a validated scoring system.

Results: Participants' nontechnical skills did not improve in the control group, whereas the provision of oral feedback, either assisted or not assisted with videotape review, resulted in significant improvement ($P < 0.005$). There was no difference in improvement between oral and videotape-assisted oral feedback groups.

Conclusions: Exposure to a simulated crisis without constructive debriefing by instructors offers little benefit to trainees. The addition of video review did not offer any advantage over oral feedback alone. Valuable simulation training can therefore be achieved even when video technology is not available.

FULL-SCALE high-fidelity mannequin simulators are increasingly recognized as useful educational adjuncts. Within anesthesia, these tools are used for various training purposes, including simulating rare events, teaching technical skills, or advanced life support algorithms.1 The simulation room is also an ideal setting for teaching the principles of crisis resource management.2 In this environment, the importance of nontechnical skills such as task management, team working, situation awareness, or decision making, can be safely practiced. A recent study confirmed the instructional value of simulation for acquiring these cognitive and interpersonal skills.3 Simulation-based learning is typically experiential.4 The experience is affected by the quality of the scenario, the instructor's expertise, and the feedback process.5

The debriefing process following a scenario allows trainees to reflect on their performance as well as receive the instructor's feedback. Reviewing one's performance by video may be a useful adjunct to the debriefing process. Among supposed benefits, it is thought to provide an objective record, facilitate instructor's constructive comments, and promote trainee's self-assessment. Videotape feedback has proven useful in other fields outside of medicine and in some areas within medicine, including anesthesia.6,7 Although many educators believe in its value, videotape feedback is not systematically used in simulation. In addition, despite the perceived importance of the debriefing process during simulation, only one study has empirically assessed its impact, and the study was inconclusive.8 The purpose of this study was to assess the value of the debriefing process during simulation-based education.

We compared the changes in nontechnical performance when anesthesia residents received no feedback, instructor oral feedback only, or videotape-aided instructor oral feedback.

Materials and Methods

Participation and Orientation Phase

After Institutional Research Board (St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada) approval, anesthesia residents in postgraduate years 1, 2, and 4 from the University of Toronto were invited to participate in the study. Informed consent and confidentiality were ensured. Anesthesia residents were randomized to receive no feedback, oral feedback only, or oral feedback with videotape review.

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The graph shows the percentage of score change (+/- SE) for the control, oral, and video-assisted oral intervention groups. The control group showed no significant change, while the oral group had a significant increase in score change (P < 0.05). The video-assisted oral group also showed a significant increase in score change (P < 0.01). The NS (not significant) line indicates that there is no significant difference between the control and video-assisted oral groups. The bar chart indicates that the posttest minus pretest total ANTS scores were compared among the groups.
Circumplex Model of Emotion (Russel, Feldman-Barrett)
Zones of Proximal Development

Zone of proximal development
(Learner can do with guidance)

Learner can do unaided

Learner cannot do
Farhan: "May I be excused? My brain is full."
PROPERTIES OF EXPERTISE:

What characterizes EXPERT THINKING from NOVICE THINKING in professional practice?
# CHARACTERISTICS OF EXPERTISE

<table>
<thead>
<tr>
<th>Area</th>
<th>Feature of Expertise</th>
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<tr>
<td>Pattern Recognition (non-analytical</td>
<td>Recognition of complex patterns</td>
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<tr>
<td>reasoning)</td>
<td>High levels of declarative and procedural knowledge</td>
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<td></td>
<td>Organized, reflecting a deep understanding</td>
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<td>Conditionalized on sets of circumstances</td>
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<td>Can flexibility retrieve with little intentional effort</td>
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<tr>
<td>Skills</td>
<td>Performance of skills may be automatic</td>
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<tr>
<td>Cognitive Space/Working Memory</td>
<td>As knowledge automated, additional cognitive space/working memory available for deliberation</td>
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<tr>
<td>Metacognitive monitoring</td>
<td>Skilful/automatic monitoring of whole situation</td>
</tr>
<tr>
<td>Teaching Ability</td>
<td>Not necessarily good teachers</td>
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<tr>
<td>Flexibility</td>
<td>High levels of contextual flexibility</td>
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<td></td>
<td>Can consider more possibilities than average practitioner</td>
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<tr>
<td></td>
<td>Varying levels of flexibility in approaches to new situations</td>
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PROMOTING THE DEVELOPMENT OF EXPERTISE IN OUR LEARNERS:

Bridging Gaps in Professional Education:
Helping the Learner move from Unconsciousness to Consciousness through Reflective Practice…..
Moving from theory to practice…

5 (or 6) microskills for clinical teaching

1. get a commitment from learner
2. probe for supporting evidence
3. teach general rules
4. reinforce what was right
5. correct mistakes
6. identify next learning steps
Summary

• Learning is an active process
• Knowledge is constructed
  – Not transferred!
• Learning relies on prior knowledge
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• Importance of *Metacognition*
Thanks for your attention!

Questions???
Comments?...