# How Students Learn:

### considerations for teaching & assessments



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# As teachers in Medicine & Allied Health Sciences, you will:

**Understand** theoretical prerequisites for enhanced learning

Appreciate extent of empirical evidence supporting how students can enhance their self-learning skills

Adapt your pedagogy to be consistent with a "learning" model in lieu of a "teaching model"





## Services in health care: Then





## Over the past 200 years: Then & Now

# Services in health care: Now





# Teaching in health care: Then





# Teaching in health care: NOW







# Teaching = Learning



### **If Assumption is Correct**

### Then effective information transfer occurs by lecturing





**If Assumption is Correct** 

# Effective information transfer also can occur by teachers assigning readings





# Thus, trend in higher education is moving

### From:

Teacher centered (how I should lecture to be effective)

Knowledge outcomes (what content needs to be covered)

Emphasis on adequate coverage of content

Assessment of learning

### **Towards:**

Student centered (what do they need to do to be effective)

Graduate outcomes (what skills they need to perform)

Emphasis on adequate selflearning skills

Assessment for learning

# **Active Learning**



Constructive Contextual Collaborative



# What conditions facilitate transfer of information from:

- short term memory to long term memory
- and vice versa?





New information

### Stimulus

### Learner's Brain



# C<sup>1</sup>, C<sup>2</sup>, C<sup>3</sup> is akin to oil, enabling gears to be effective: - level of processing facilitated

# New information

Information is processed to some degree





New information

Information is processed to some degree

Amount depends on presence of 3 C's



New information

Information is processed to some degree Amount depends on presence of 3 C's C's also stored





Question / Problem is posed Previously stored C's help trigger long term memory



Question / Problem posed Previously stored C's being present, trigger retrievals from long term memory C's also retrieved



Question / Problem answered Previously stored C's help trigger long term memory Retrieval C's also efficiency from retrieved long term memory depends on 3 C's



# Constructive

# Activation of prior knowledge facilitates acquisition & recall of new information

## One of Canada's favorite winter sports

Curling

1.2

















# HOUSE

### - this is where you want always want to go: into your 'house'







# HOG

( if people 'hog' something, they keep it away from others)







# HACK

('*hack*' or dig something out of the ice)









### Contextual

# Contextual data are cognitively stored along with new information as it is acquired





# Collaborative

Collaboration requires one to verbalize & share (explain) the new information to others closure develops & enables efficient storage & retrieval of the new information



Construct the new knowledge

- as new information is introduced, activate prior knowledge

## Contextualize the learning

 introduce new information using an appropriate context (which will be also stored & enables improved retrieval)

## Collaborate while learning

- require learners to be responsible for each others' learning


- Individualistic learning
  - learner works alone, minimal interaction with other learners
  - positive rewards are given according to preset criteria (e.g., the criteria set down for qualifying for a license to practice medicine)
- Competitive learning
  - participants work alone, minimal interaction with other learners
  - a negative reward results <u>if</u> social interdependence occurs (i.e., chance of being chosen as the best is not as likely)
  - positive rewards are given on a norm reference basis (candidates are ranked from best to worst as in assigning grades for a course)



## **Three Basic Pedagogical Strategies**

#### Individualistic learning

- learner works alone or with minimal interaction with other learners, no social interdependence
- positive rewards are given according to set criteria

#### **Competitive learning**

- Participants work alone with minimal interaction with other learners
- there is presence of a negative reward if social interdependence occurs (i.e., being spotted as the best is not likely to be recognized)
- positive rewards are given on a norm reference basis (learners are ranked from best to worst)



#### **Collaborative learning**



Students work together to achieve shared learning goals

 each student can achieve his/her learning goal *if and only if* the other group members achieve theirs

Solidly based on theories in:

 anthropology, sociology, economics, political science & psychology







A wide range of collaborative learning models have been operationalized into clear procedures that educators use

- "Learning together",
- "Team-games-tournaments",
- "Group investigation",
- "Constructive controversy",
- .

(there are at least 8 frequently used models)



#### Validated by research

900+ research studies in past 11 decades

meta-analysis of 164 studies (1970 up to 1998)

- 8 different collaborative learning models were included
- 70% of studies included random assignment of individuals or by groups to different learning strategies
- collaborative learning had beneficial effect size of 0.18 to 1.03 compared to competitive or individualistic learning

## [Johnson & Johnson, 2000]



The studies were conducted in Asia, North America, Europe, Africa & Middle East using

- different age groups, economic classes, subject areas
- various dependent variables

achievement, higher level reasoning, retention time, transfer of learning, motivation, moral reasoning, social competencies

All 8 collaborative learning models were found to be better



## The 3 C's in Active Learning



Create a cognitive framework for the learner

[ i.e., describe a problem so learner is able to build on his/her present information ]

Learning stituation needs to be meaningful

[ i.e., contextualize the new information, enabling its efficient storage & retrieval ]

Learner needs to be active in acquiring the information [i.e., teaching others & others reciprocating as teachers]



## Need to Adjust our Educational Programmes

#### Traditional lecturing does not adhere to these learning principles

#### Therefore, lecturing does not optimize learning



## **Research Supports this Theoretical Framework**



National Training Laboratories, Bethel, Maine, USA





Knowledge transfer

 Which content is most important Knowledge acquisition

• Which student needs are most important





Students are passive

- Students are active
- Teachers provide answers
  Teachers ask questions





- Lecture theatres & classrooms are essential
- Lectures are essential

- Library & active learning facilities are essential
- Assessment is essential



We can, in a lecture, tell students that

- phenytoin is a drug of choice for controlling seizures
- if important, want students to remember this factual info.

But what about future developments?

- scientific advances may find a better therapeutic, or one that is more cost-effective, or one with less side effects
- unfortunately, these advances may occur after finishing their medical degree



- Can't assume because we helped student to achieve a critical amount of knowledge that
  - s/he should manage keep up with future developments
- World of health care information has radically changed
  - knowledge doubles every 5 yr, in medicine every 3 yr
  - exponential growth in knowledge will continue

"Give a man a fish & he will be able to provide his family with food tonight. Teach a man to fish & he will be able to provide food for his family every night"

- Teaching students phenytoin is a drug of choice for seizures is akin to providing the man with a fish
- Teaching how to keep pace with exponentially growing literature on drug development is teaching a man to fish
  - rate new knowledge grows makes it necessary to accept responsibility for teaching students how to keep abreast



- For students to learn phenytoin is a preferred therapeutic for controlling seizures, we do not have to tell students this in a lecture
- Rather, using evidence-based medicine methodologies
- we can help students learn this content
- and at the same time have them acquire 'how-to-learn' (meta-cognition) skills, i.e., life-long learning skills



First create a problem by using a realistic clinical scenario

An adult female has had a car accident & seeks treatment. She recovers but occasionally suffers from seizures. You conclude that she will need medication to control her seizures but are unsure which medication might be most appropriate but also has few side effects.



Then, using evidence-based methodologies, we help students to acquire skills in meta cognition . . .

## **1** Where to find the information

the electronic databases having answers for this type of question

2 How to phrase a research question for which an answer can be found





## Example of how this can be done (cont'd)

using evidence-based methodologies, we help students learn . . .

3 How to use components of the research question as search terms

Patient, Intervention, Comparison, Outcome

4 How to use powerful search engines available in the health sciences (OVID)





using evidence-based methodologies, we help students learn . . .

- 5 How to critique published articles that are found (this review is done in collaborative groups of 4 6)
  - were groups randomized?
  - were patients treated same except for drug of interest?
  - was follow up period sufficient in length?
  - were patients analyzed in groups to which they were assigned (i.e., intention to treat analysis)?



using evidence-based methodologies, we help students learn . . .

### 6. Can I apply the results to my patient?

- Were the study patients similar to my patient?
- Were all clinically important outcomes considered?
- Are the likely treatment benefits worth the potential harm & costs?



using evidence-based methodologies, we help students learn . . .

7. Where to quickly find methodological information (in the Abstract & Methods sections)

students learn to skim literature with confidence

- no further reading needed if answers are negative
- entire article read only if answers to previous questions are positive





Published therapy & harm studies that meet evidencebased standards are much fewer than those <u>not</u> meeting the standards

Far fewer articles meet evidence-base criteria for economic analysis, overviews & decision analysis

Thus, coping with growing voluminous literature base is made more possible

Advancements in pedagogy for adult learners are not dissimilar to changes in health sciences

- now know not only what current content should be taught
- but also know how students can learn that content more thoroughly, more permanently, more meaningfully

Because of these pedagogical advances & because learning needs have changed due to the information revolution

- students need to know not only relevant, important content but also 'how-to-learn' learning skills (i.e., life-long learning skills)
- teachers are responsible for students' mastery of both skills
- today's medical & health science curricula & their assessment systems need to include both as student learning outcomes





Time invested in learning additional how-to-learn skills, by utilizing evidence based approaches, is cost effective

Learning search & critiquing skills while finding that phenytoin is drug of choice for controlling seizures, students have developed

 the means for finding relevant evidence for other drugs (produced now or in the future): a life-long learning skill

## That is, we taught a man to fish rather than simply giving him a fish

In illustrated example of how to develop life-long learning skills

- a meaningful context was provided (clinical)
- students were active in acquiring the evidence
- students critiqued articles in collaborative groups

Thus, the specific content (i.e., phenytoin is the drug of choice for seizures) will be efficiently stored and effectively retrieved

long term recall of this fact will be better than if we simply told them & expected them to remember this information

## **Assessed Learning**

Assessment for learning



- What is best *learned is not* what's *taught*
- What is best *learned is* what's *tested*

Examinations drive learning in medical undergraduates



- If one teaches clinical & scientific reasoning, but
  - tests for only recall of scientific & clinical facts, then
  - students will learn primarily facts

and far fewer reasoning or problem solving skills

## Thus, the key criterion for good exams

# Create tests that assess what you want your students to learn



## To exhibit *higher thinking skills*, students need some contextual information in which there is an embedded problem

Consider the following two items . . .



# Acute intermittent porphyria is the result of a defect in the biosynthetic pathway for

- A. collagen
- **B.** corticosteroids
- C. fatty acids
- D. glucose
- E. heme \*

Swanson & CASE, 2001


An otherwise healthy 33-year-old man has mild weakness and occasional episodes of steady, severe abdominal pain with some cramping but no diarrhoea. During an episode, his abdomen is distended, and bowel sounds are decreased. He has a mild weakness in the upper arms.

These findings suggest a defect in the biosynthetic pathway for:

- A. collagen
- **B.** corticosteroids
- C. fatty acids
- D. glucose
- E. heme \*

Both have the same options, but
 1<sup>st</sup> item tests knowledge (memorised facts)
 2<sup>nd</sup> item tests application of knowledge

 To achieve the 2<sup>nd</sup>, develop a meaningful problem from which a question or task can be posed
 i.e., use a scientific scenario or a clinical vignette



A clinical vignette includes a scenario (a story) in which a patient is described, including some of the following:

- Age, Gender (e.g., A 32-year-old man)
- Site of Care (e.g., presents at your dispensary)
- **Presenting Complaint** (e.g., with severe pain in his left shoulder)
- **Duration** (e.g., that has continued for 2 days;)
- **Patient History**
- **Physical Findings**

- (e.g., he works in construction;)
- (e.g., his physician prescribed \_\_\_\_\_ subsequently patient experienced \_\_\_\_\_

# Advantage in using a clinical vignette

Face validity goes up



- Students find that they have to apply their knowledge to make a decision or solve a problem
- The context provided by the vignette will be cognitively stored

CKM is a 20-year-old woman receiving 300 mg phenytoin for treatment of a generalized disorder secondary to a motor vehicle accident 1 year ago. Although seizure free for the past 6 months, she now reports being increasingly confused and lethargic.

Nystagmus is detected at physical examination. She is taking no other medications, but has been dieting to lose weight before her upcoming wedding. A total phenytoin concentration is obtained and is reported to be 14 mg/L (desired range, 10 to 20 mg/L).

Other laboratory results are as follows:

 Na: 138 mEq/L (135-145 mEq/L)
 K: 3.5 mEq/L (3.5-5 mEq/L)

 BUN: 10 mg/dL (8-20 mg/dL)
 CI: 98 mEq/L (96-106 mEq/L)

 Cr: 1.0 mg/dL (0.7-1.5 mg/dL)
 ALT: 8 IU/L (0-35 IU/L)

 Albumin: 2.5 g/dL (3.5-5 g/dL)
 AST: 10 IU/L (0-40 IU/L)

**Question 1** 

What is this patient's primary drug-related problem?

- A. Phenytoin toxicity secondary to impaired hepatic function
- B. Phenytoin toxicity secondary to impaired renal function
- C. Phenytoin toxicity secondary to a decrease in protein <sup></sup><sup>∗</sup> binding
- D. Phenytoin toxicity secondary to a decrease in free phenytoin concentration
- E. Phenytoin toxicity secondary to serum electrolyte abnormalities

#### Seizure Disorders (cont'd)

#### **Question 2**

After her phenytoin therapy has been optimized, CKM returns to the clinic just before her wedding and requests an oral contraceptive. What advice should be given to this patient?

- A. There is no potential drug-drug interaction
- B. Phenytoin inhibits the metabolism of oral contraceptives and may increase their side effects
- C. Oral contraceptives inhibit the metabolism of phenytoin and may increase its side effects
- D. Phenytoin induces the metabolism of oral contraceptives and may decrease their efficacy ⅔
- E. Oral contraceptives induce the metabolism of phenytoin and may decrease its efficacy

#### Seizure Disorders (cont'd)

#### **Question 3**

CKM returns for a routine follow-up visit in 1 yr after the wedding. She is relatively seizure free. She & her husband are considering starting a family. Which of the following vitamin supplements is recommended for women taking anticonvulsants to reduce the potential for teratogenic effects?

- A. Thiamine
- B. Ascorbic acids
- C. Vitamin K
- D. Folic acid 🔻
- E. Vitamin B<sub>12</sub>

## Advantage in using clinical vignette

- Improves item's discrimination power
- Poor and better students perform differently
- Students (who only memorize information) often cannot answer questions that assess application of knowledge



Are there pedagogical reasons to structure questions to test more than recall of isolated facts . . . particularly when it's so important to have a good factual base?



The answer is Yes:

## Not because the application question is more difficult

# Not because facts are thought, inappropriately, to be unimportant





- Study preparation for application of facts, is different than for recall of facts
- Paradoxically, preparing for an assessment that measures application helps students to remember more facts, not less
- For students in medicine and the allied health sciences, facts are easier to remember if they become organised in relevant fashion

Providing a CONTEXT is the key factor for ensuring facts are organized in a relevant fashion

# Some evidence to show that context is important & needs to be provided

- Have you ever gone from one room to another, looking for something, & when you got there you couldn't remember what it was you were intending to retrieve?
- Did you go back to the first room & then recalled what it was that you needed?
- This was not co-incidental
  - the first room provided a context
  - the first room cognitively trigged recall of the object because it was there that you needed to use it



Experimental evidence to support thesis that context is important & needs to be provided

# Classical experiment with scuba diver qualification tests

results on written tests (re. decompression) by students who took test underwater were better

compared to those who took test in a classroom



 given nitrogen toxicity build-up that occurs during a dive, opposite result would be expected Experimental proof about importance of providing context

# We will use a small, but soundly designed, experiment to prove importance of context



# Two members in this audience are needed

- Randomly select two members
- Both leave room after randomly assigning which will come back first & take test
- Second person then comes in & takes test
- Both are requested to try to do as well as possible





#### **Randomly select**

#### **Randomly assign**

#### Candidates please leave the room; will call each of you when to return





Although we're using a sample of two (i.e., statistical power for this experiment is minimal)

however, the effect size is so large that I'm still confident of the experimental outcome

> --- so confident I'll make a wager that the 2<sup>nd</sup> person will do better



To make it even more difficult for me to win the wager

- my choice will have less time to prepare for the test
- you will score each candidate on the test, not me
- If I am wrong, I will donate \$100 (USD) to the Med. Ed. Unit
- If I am right, I get to keep my money











#### You have one minute to study the following material.

#### Please try to remember as many points as you can.



Standing sometimes helps. Doing it in rain can be hazardous. Leaning forward helps a lot but leaning a lot in other directions is a hindrance. Gearing up makes things harder. Doing it on cement is better than grass and on grass is better than rocks. Using one hand is optional but only when seated. Having chains is effective but ropes are not. Using sidewalks makes people unhappy. Using both legs is easier than one. Facing wind is problematic but having good air pressure is helpful. Going backwards is difficult. Learning is easy and it's difficult to forget. Tipping is not a gratuity and often hurts more. Using it, even if you don't move, is recommended by doctors.









#### I will give <sup>3</sup>/<sub>4</sub> minute to study the following material on

## How to Ride a Bicycle

#### Please try to remember as many points as you can.



## How to Ride a Bicycle

Standing sometimes helps. Doing it in rain can be hazardous. Leaning forward helps a lot but leaning a lot in other directions is a hindrance. Gearing up makes things harder. Doing it on cement is better than grass and on grass is better than rocks. Using one hand is optional but only when seated. Having chains is effective but ropes are not. Using sidewalks makes people unhappy. Using both legs is easier than one. Facing wind is problematic but having good air pressure is helpful. Going backwards is difficult. Learning is easy and it's difficult to forget. Tipping is not a gratuity and often hurts more. Using it, even if you don't move, is recommended by doctors.

#### Let's see who remembered the most points

#### My prediction: 2<sup>nd</sup> candidate



.....

#### Remembering details is much more onerous if a meaningful context is not available





- For medical & allied health science students their orientation is clinical, patient-centered
  - using a clinically oriented vignette is certainly helpful
  - but only describing some patient (or a disease) doesn't necessarily make the task *meaningful*
- To develop a meaningful context requires task to mimic real life (i.e., clinical practice)



- A practice-oriented question that lacks a meaningful context (& thus only measures recall)
  - begins by citing a disease & then asks for which patient findings are to be expected
- Sequence is backwards to what happens in real life
  - patient rarely tells the doctor what disease s/he has, after which the doctor asks for signs & symptoms
  - sequence is unfortunately similar to how many textbooks do cover material



# Here's an illustration of a question that lacks meaningful context



For which of the following neurological diseases is administration of Citalopram the most appropriate medication in a geriatric female?

- A. Depression \*
- B. Alzheimer's disease
- C. Schizophrenia
- D. Partial onset of seizures
- E. Recurrent seizures

Generali & Berger, 1997





### In clinical practice, psychiatrists do not go out searching for a depressed patient in order to administer Citalopram







A 67-yr-old female lost her husband 10 months ago. Her two children have moved to Khaluf. She has no other close relatives & lives alone. Although she used to rise early & join friends for tea, she now stays in bed until noon. She eats irregularly & often doesn't bother to shop for food. When friends come to visit, she is non communicative, only complaining she has nothing to live for.

As her physician, you diagnose depression and consider use of a medication as an appropriate therapeutic intervention.

Which of the following medications would be the most appropriate choice for this patient?

- A. Rivastigamine
- B. Ziprasidone
- C. Citalopram \*
- D. Oxcarbazepine
- E. Levetiracetam



"If you want to change student learning, change the methods of assessment."

[Elton & Laurillard, 1979; Brown, Bull & Pendlebury, 1997]

"Assessment is a potent agent for enhancing or injuring the quality of higher education."

[Ramsden, 1982]

"Assessment dominates students' thinking and will dominate the way they go about their learning."

[Chalmers & Fuller, 1996]



## Aligned

## **Outcomes, pedagogy & assessments**


- Objectives that we set
- Curriculum that we design
- Teaching methods that we use
- Assessments that we administer
- Feedback that we provide after the assessments
- Atmosphere we create for teacher-student interactions
- Climate that we create for interactions among students
- Institutional policies & procedures that we have to follow

[Biggs, 2003]



Teachers take professional approach to student learning

- accept responsibility for teaching content & 'how- to-learn' (meta-cognition) skills
- students have opportunity to learn content and skills of 'how-to-learn'
- students are provided *time* to learn both content and skills of 'how-to-learn'



Teachers take professional approach to assessments

- able to develop assessments of content <u>&</u> of skills in learning 'how-to-learn'
- grade effectively & provide formative feedback
- students are guided how to learn from feedback



Teacher & students goals for assessment often are not aligned

#### **Teacher's emphasis usually is to**

determine how much students have learned & make judgments about adequacy of their performance

## Students' emphasis usually is to

conceal what they don't know, as any demonstrated lack of understanding impacts on their grades





CKM is a 20-year-old woman receiving 300 mg phenytoin for treatment of a generalized disorder secondary to a motor vehicle accident 1 year ago. Although seizure free for the past 6 months, she now reports being increasingly confused and lethargic.



What is this patient's primary drug-related problem?

- A. Phenytoin toxicity secondary to impaired hepatic function
- B. Phenytoin toxicity secondary to impaired renal function
- C. Phenytoin toxicity secondary to a decrease in protein \* binding
- D. Phenytoin toxicity secondary to a decrease in free phenytoin concentration
- E. Phenytoin toxicity secondary to serum electrolyte abnormalities



Phenytoin is highly protein bound, particularly to albumin. A decrease in serum albumin can increase the concentration of free phenytoin, which is the pharmacologically active component. Patients with low albumin concentrations or impaired protein binding may have drug toxicity despite "normal" serum phenytoin concentrations.

Ref: Phenytoin. In: Basic Clinical Pharmacokinetics. 3rd ed. Chapter 10.

### **Seizure Disorders**

2<sup>nd</sup> Question

After her phenytoin therapy has been optimized, CKM returns to the clinic just before her wedding and requests an oral contraceptive. What advice should be given to this patient?

- A. There is no potential drug-drug interaction
- B. Phenytoin inhibits the metabolism of oral contraceptives and may increase their side effects
- C. Oral contraceptives inhibit the metabolism of phenytoin and may increase its side effects
- D. Phenytoin induces the metabolism of oral contraceptives and may decrease their efficacy \*
- E. Oral contraceptives induce the metabolism of phenytoin and may decrease its efficacy



Phenytoin is an enzyme inducer. It may increase the metabolism of oral contraceptives & reduce their efficacy. Patients should be advised to consider alternative methods of contraception to avoid unplanned pregnancy.

Ref: Seizure disorders. In: Young LY, Koda-Kimble MA, eds. *Applied Therapeutics: The Clinical Use of Drugs.* 6th ed. Vancouver, Wash: Applied Therapeutics; 1995.



# **Seizure Disorders**

**3rd Question** 

CKM returns for a routine follow-up visit in 1 year after the wedding. She is relatively seizure free, and she and her husband are considering starting a family. Which of the following vitamin supplements is recommended for women taking anticonvulsants to reduce the potential for teratogenic effects?

- A. Thiamine
- B. Ascorbic acid
- C. Vitamin K
- D. Folic acid 🗱
- E. Vitamin B<sub>12</sub>



Although folic acid may not reliably reduce the risk of birth defects in women receiving antiepileptic drugs, adequate folate supplementation is still recommended.

Ref: Seizure disorders. In: Young LY, Koda-Kimble MA, eds. *Applied Therapeutics: The Clinical Use of Drugs.* 6th ed. Vancouver, Wash: Applied Therapeutics; 1995.





#### **Teacher emphasis now becomes**

determine the quality of student learning in order to provide feedback & suggest how students can improve their understanding

#### **Students emphasis now becomes**

avoid concealing any lack of skill or understanding by finding out what they do not know

i.e., more willing to tackle difficult tasks when prospect of poor performance is not always a threat)



- Are teachers trained to assess, grade effectively and provide useful feedback?
- Are teachers encouraged to innovate & supported (space, budget, time) by the department when they try to innovate?
- Are teachers awarded if they achieve desired student learning outcomes?



## Are programs reviewed in terms of their assessments?

Is there a range of assessments?

- do assessments elicit different levels of learning?
- are students exposed to increasingly sophisticated levels of tasks?
- are students required to integrate skills & knowledge?



Do administrative policies drive & reward enhanced learning?

 supporting a pedagogical culture whereby the students, faculty & administrators uniformly pursue the same goals (i.e., desired student learning outcomes)

# **Review & Summary**

# Learning = Education Teaching ≠ Education



# What is Learning?

# Learning

- an internal change in the structure & content of a mind

# **Educators need to decide**

- what do students need to be familiar with & to know?
- what do students need to be able to do?
- what values & attitudes do students need to have?





# How does one achieve enhanced learning?

new information is provided in a manner that is:

Constructive, Contextualized, Collaborative

# Who is an excellent teacher?

 one that facilitates students learning, learning more, learning more easily, learning more permanently





# **Questions in Pedagogy**

# What is an excellent education?

students learn important content and 'how-to-learn skills'

How do we provide an excellent education? students are *active*,

students are *assessed* on application of knowledge

student learning outcomes, teachers' pedagogy, department's assessments, Faculty's courses & University policies are *aligned* 



# ... a return to some evidence



 "There's lots of work being done for all the wrong reasons... you learn what's necessary to get grades, but when you come out of class you don't know anything ...if you tried to really learn anything, it would handicap you getting a good grade."

[Ramsden, 1992]



"I'd much prefer being able to thoroughly understand the work. It is so much more interesting and worthwhile if there is some meaning behind it. Unfortunately the knowledge we are expected to have leads me to simply memorise facts for exams."

[Ramsden, 1992]





"I have bits and pieces of memorised knowledge but no real understanding of concepts. From past experience, I know I will soon forget the things I have 'learned'.

[Ramsden 1992]



#### Instructional design modified

- variety active learning models introduced, but not PBL

## Assessment design modified

 used formative, continuous & summative assessments to direct desired learning

Alignment issues addressed: integrated curriculum design

- system-based, Faculty-owned (not discipline-based & owned)

#### **Changes in Proportional Time Allocated to**

#### **Passive & Active Teaching Protocols**

#### (Old & New Curricula)





- "Did a fantastic job at her first rotation, keen to learn & willing to take responsibility"
- "One of the very best interns we ever had. He has sound general medical knowledge; hard working, reliable & totally committed to his work; well liked by his colleagues."





 "Strong sense of responsibility; professional knowledge, skills & clinical judgment are excellent for her seniority; humble, quick & eager to learn. Overall excellent performance"

 "Excellent ability to take on mammoth number of tasks (both clinical & research), his patience, kindness, good communication skills & strong sense of responsibility, makes him one of the most favorite doctors in our department"





"Demonstrated impressive clinical acuity in psychiatry, astute and logical clinician, sensitive intuition, appropriate empathy and scientific objectivity; identified relevant research questions in his daily clinical encounters"

"Excellent attitude to patients; appreciation letters received from patients she cared for"



## 48% reduction in frequency of medical incidence reports

proportion of interns involved in medical incidence reports within 1-yr internship reduced from 13.09% (old curriculum) to 7.04% (new curriculum)

average number of medical incidence reports per intern per year reduced from .0444 to .0247



# There are 2 educational approaches:

one is to simply tell our students what they need to know



the other is to show students how, & require them to be, more involved in their learning

Our job as educators is to help students learn

We only have them at the start of their careers

If all we do is to prepare them for the start of their careers, we do a disservice





If we also teach them how to teach themselves (selflearning skills), they will learn more, more easily, more permanently

This additional life-long learning skill will enable them to keep pace in the race with ongoing developments in Medicine & Allied Health Sciences.





# Given your answers as added confirmatory evidence ...



