BMUS

Background Theory: Teaching & Learning

A Taster Session

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Flickr, 2009.

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Objectives

- Understand key teaching and learning theories relevant to ultrasound education
- Recognise how these theories apply in clinical and classroom teaching
- Reflection on how to improve your teaching strategy

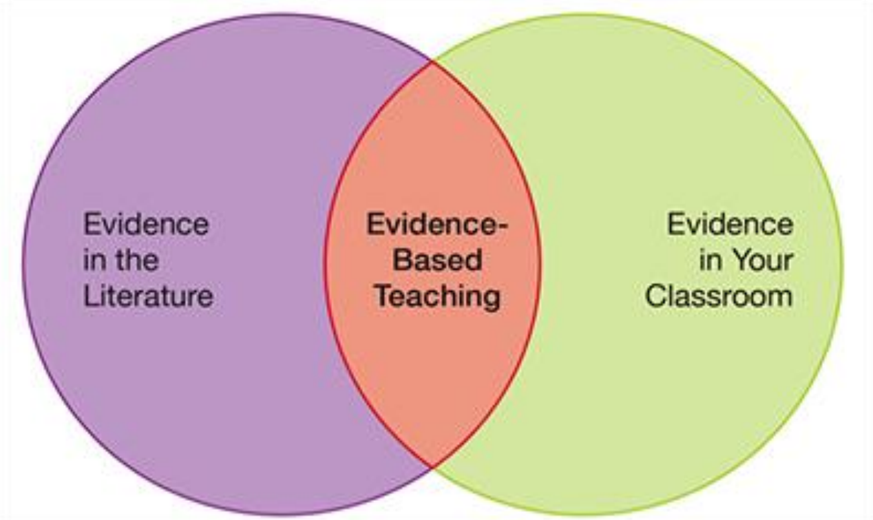
Evidence-based Practice

"Ways of teaching to enhance learning that is based on scientific evidence"

- **Knowledge about our teaching practice as well as our subject practice**
  - **Started in Medical Teaching in 1992** (Trinder and Reynolds, 2000)

- **In Higher Education it is related to:**
  - **Higher Education Research**
  - **Scholarship of Teaching and Learning (SoTL)**
  - **Education Enquiry**

- **The core areas of education research:**
  1. **Inequality, inclusion and education**
  2. **Identities: notions of education selves and subjectivities**
  3. **Teaching and Learning: Curricular and pedagogical practice**
  4. **Governance and management**

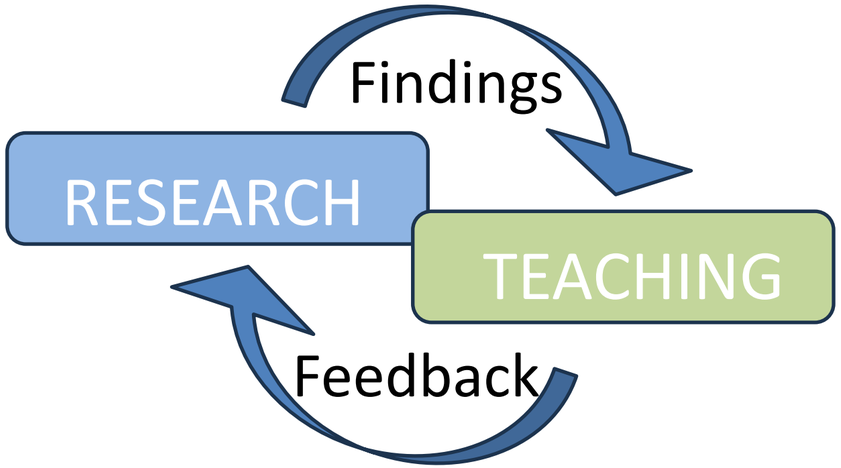


Northeastern University, 2025.

Pedagogical Research

"The study of teaching and learning"

- **Pedagogy vs Andragogy**
- **Examination of the nature of pedagogical approaches (teaching, learning and assessment) and its relationship to student learning, student experience and learning outcomes**
- **Focus → how we can support students to effectively learn**



- **Signature Pedagogies**
  - **types of teaching that organise the fundamental ways in which future practitioners are educated for their new profession** (Shulman, 2005)

Think About a Time…

- You learnt a new skill relatively quickly and easily

and

- A skill that you tried to learn, but never quite mastered

?? WHY ??

Overview of Major Learning Theories

Theory	Key Idea	Relevance to Ultrasound
Behaviourism	Learning = response to stimulus	Scanning protocols
Cognitivism	Learning involves mental processing	Conceptual knowledge (physics, anatomy)
Constructivism	Leaners build knowledge actively	Simulation, case-based learning
Social Learning	Learning via observation	Peer scanning, role modelling
Experiential Learning	Learning by doing & reflecting	Hands-on scanning

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Behaviourism Learning Theory

- **Core Idea:** Learning = change in behaviour through stimulus-response and reinforcement
- **Founders:** B.F. Skinner, Ivan Pavlov and John Watson
- **How Learning Occurs:** Through repetition, reinforcement and conditioning
- **Role of Learner**: Passive responder to stimuli
- **Role of Teacher:** Active controller of the learning environment *(provides cues, corrects errors)*

REPETITION

IMMEDIATE FEEDBACK

OBJECTIVE ASSESSMENT

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Cognitivism Learning Theory

- **Core Idea:** Learning is an active mental process where learners acquire, organise and apply knowledge
- **Founders:** Jean Piaget and Jerome Bruner
- **How Learning Occurs:** Input → Processing → Output
- **Role of Learner**: Active processor *(links new ideas to prior knowledge)*
- **Role of Teacher:** Active guide *(provides scaffolding)*

MENTAL MODELING

SCAFFOLD LEARNING

MEMORY STRATEGIES

ACTIVE PROCESSING

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Constructivism Learning Theory

- **Core Idea:** Learners construct their own understanding based on experiences
- **Founders:** Lev Vygotsky, Piaget and Bruner
- **How Learning Occurs:** Knowledge emerges through doing, reflecting and interacting
- **Role of Learner**: Highly active *(self-directed)*
- **Role of Teacher:** Facilitator *(supports exploration)*

LEARNING BY DOING

CASE-BASED LEARNING

PEER COLLABORATION

REFLECTION

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Social Learning Theory

- **Core Idea:** Learning occurs through observation and interaction
- **Founder:** Albert Bandura
- **How Learning Occurs:** Observing, imitating, and interacting with others
- **Role of Learner**: Active and observant
- **Role of Teacher:** Facilitator and role model

OBSERVATIONAL LEARNING

ROLE MODELING

SOCIAL REINFORCEMENT

VICARIOUS LEARNING

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Experiential Learning Theory

- **Core Idea:** Direct experience, followed by reflection, conceptualisation and experimentation
- **Founder:** David Kolb
- **How Learning Occurs:** Learning through reflection on doing
- **Role of Learner**: Active and reflective
- **Role of Teacher:** Facilitator

LEARN BY DOING REFLECTION OWNERSHIP

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Matching Theory to Practice

Situation	Best Approach	Learning Theory
New Learners	Deductive teaching and repetition	Behaviourism, Cognitivism
Intermediate Learners	Mix of case-based and hands-on	Constructivism, Experiential
Advanced Learners	Peer teaching, critical discussion	Social learning, Constructivism

It is a balance based on learner level

Deductive: Rule → Example

Inductive: Example → Rule

Marshall, 2019; Race, 2015; Merriam and Bierema, 2013.

Deep and Surface Learning

Jabberwocky

“Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogroves,
And the mome raths outgrabe.”

1. **What were the slithy toves doing?**
   (easy to answer question)

2. **Why were the borogoves all mimsy? Were the mome raths justified to be outgrabe?**
   (more complex question)

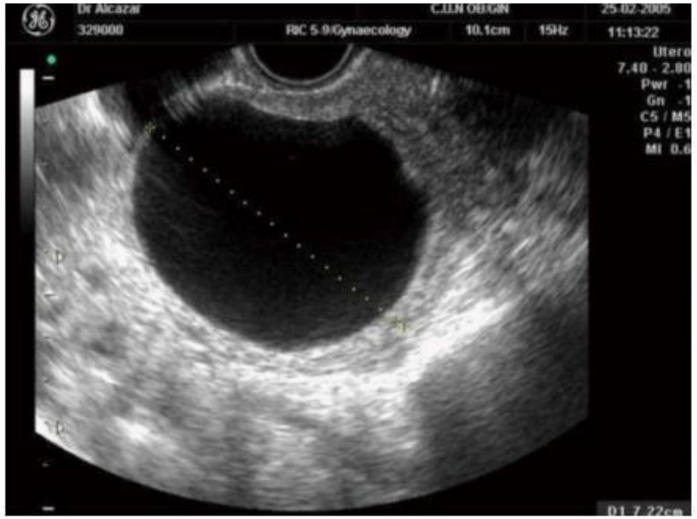
Carroll, 1871

Deep and Surface Learning

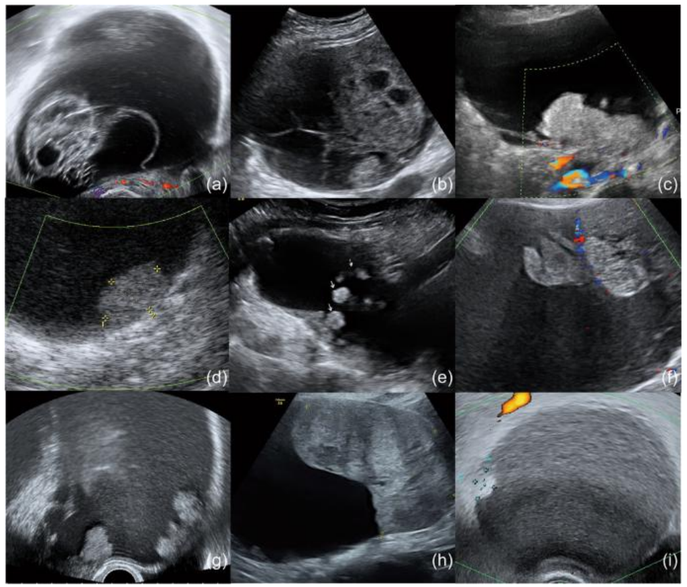
"When students feel this need-to-know, they automatically try to focus on underlying meanings, on main ideas, themes, principles or successful applications"

Biggs and Tang (2007, p.24)

- **Students more actively engage with the subject matter if they are interested**
  - **Educator needs to place value on the learning**



Alcazar et al. 2015

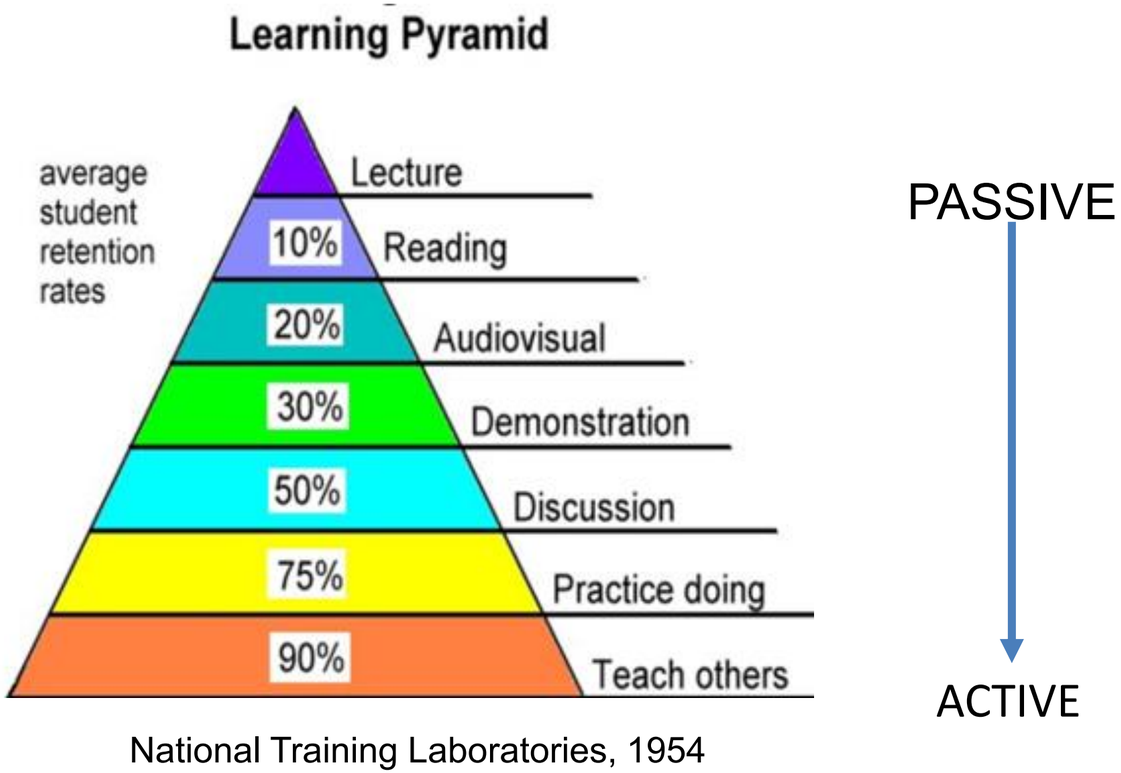


Huang et al. 2022

Summary

- Use theory to guide your teaching choices
- Match method to learner level and task type
- **Effective teaching = theory + practice + purpose**

1. What theory do you use most in your teaching?
2. How could a different approach help your learners?



National Training Laboratories, 1954

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Images

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