Foundations of Problem-based Learning

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Origins and Variations of PBL

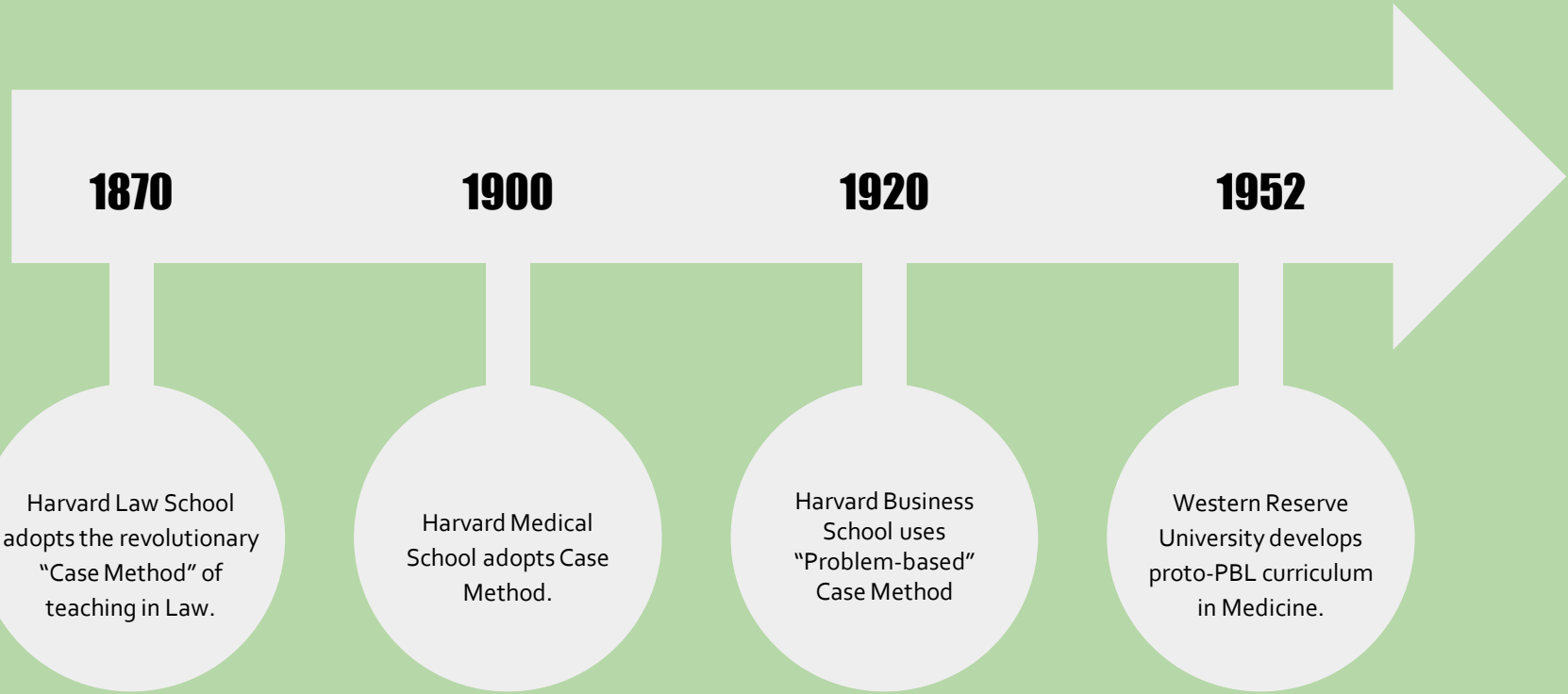
Mind the “P” in “PBL”

In **Problem-based learning**, the problem is presented as a puzzle, dilemma or case (medical, business, legal or otherwise) for the student to analyze over a short period of time.

In **Project-based learning,** the problem is defined by students and carried out as a research and investigation project over a long period of time.

The ancestors of Problem based learning

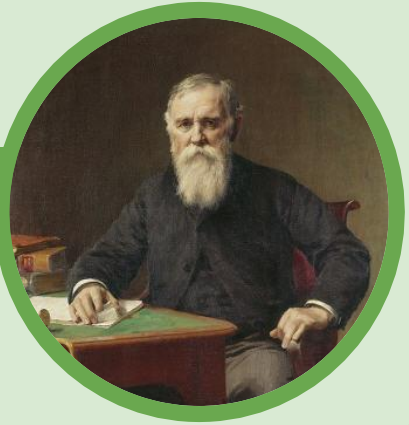
Let's go back to the beginning...



Harvard Case Method
1870 - 1930

1870

Law School



1900

Medical School

1920

Business School

Two Case Methods

1 By Analogy

- Law School (1870)
- Medical School (1900)
- Based on ideas of Empiricism (David Hume)
- Defined field with limited principles & set literature.

2 Problem-based

- Business School (1920)
- Based on ideas of Progressive Education & the Problem-method (John Dewey)
- New field with unclear literature & principles.

Case Western Reserve 1952

Sample of 1st Year Allocation of Study Hours (Total 34.5 Weeks)	
Interdisciplinary Basic Sciences	682 hours
Research Projects	231 hours
Self-Study Time	352 hours
Clinical Sciences	97 hours

Problem-based Learning Begins

McMaster University
1969

The Founding Fathers

Dr. John Evans

Dr. Jim Anderson

Dr. Bill Spaulding

Dr. Fraser Mustard

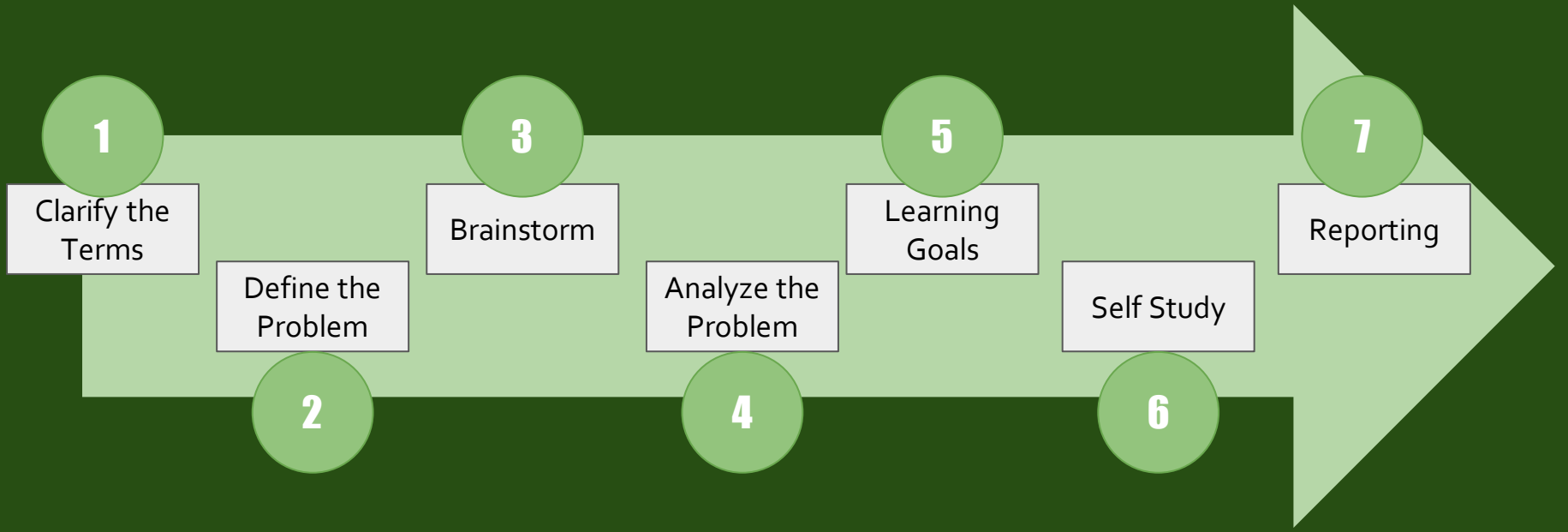
Dr. Bill Walsh

Features of the McMaster Programme

1. The integration of disciplines under the umbrella of a systems approach.
2. The use of small groups as the unit of learning.
3. The development of problems as the starting point of learning.
4. The limited use of lectures.
5. The quasi disappearance of summative assessment.
6. The inclusion of a community outlook throughout the programme.

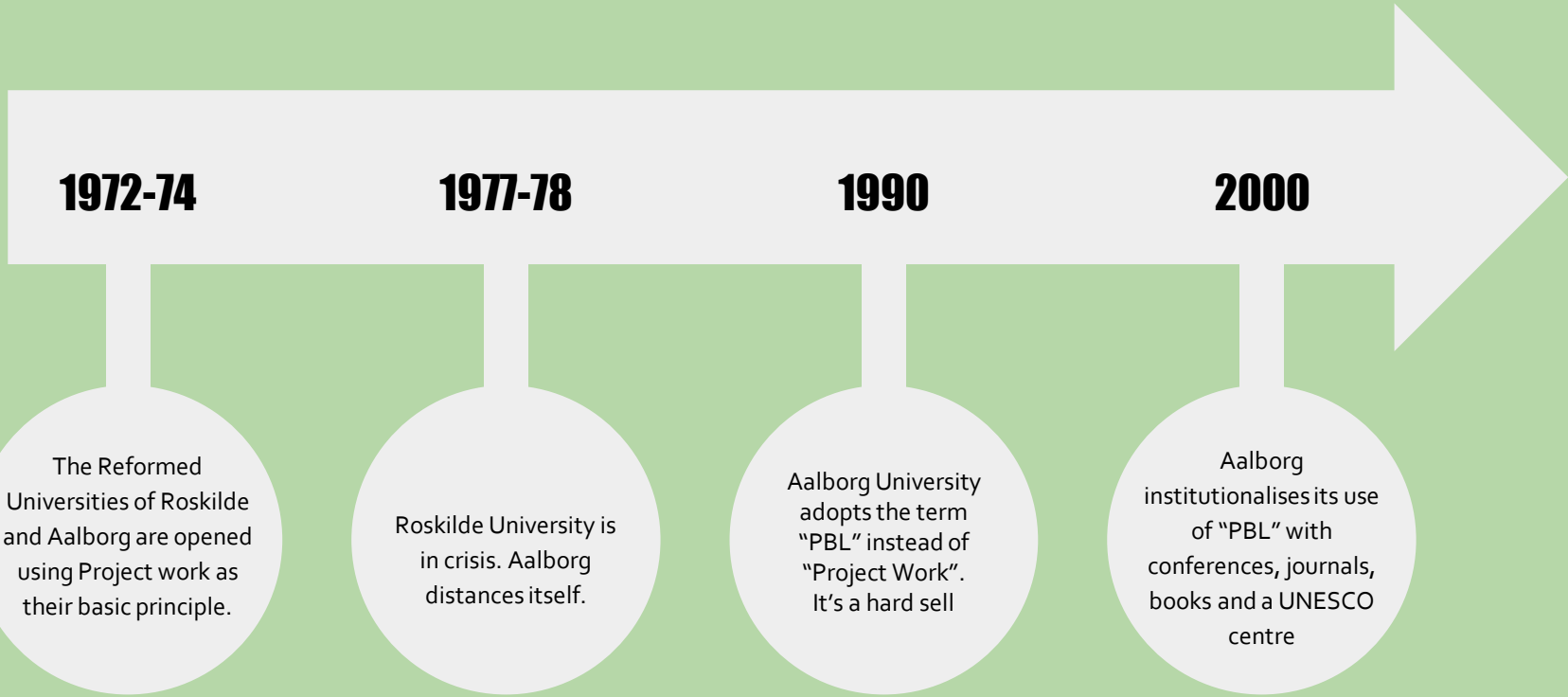
Maastricht University
1974

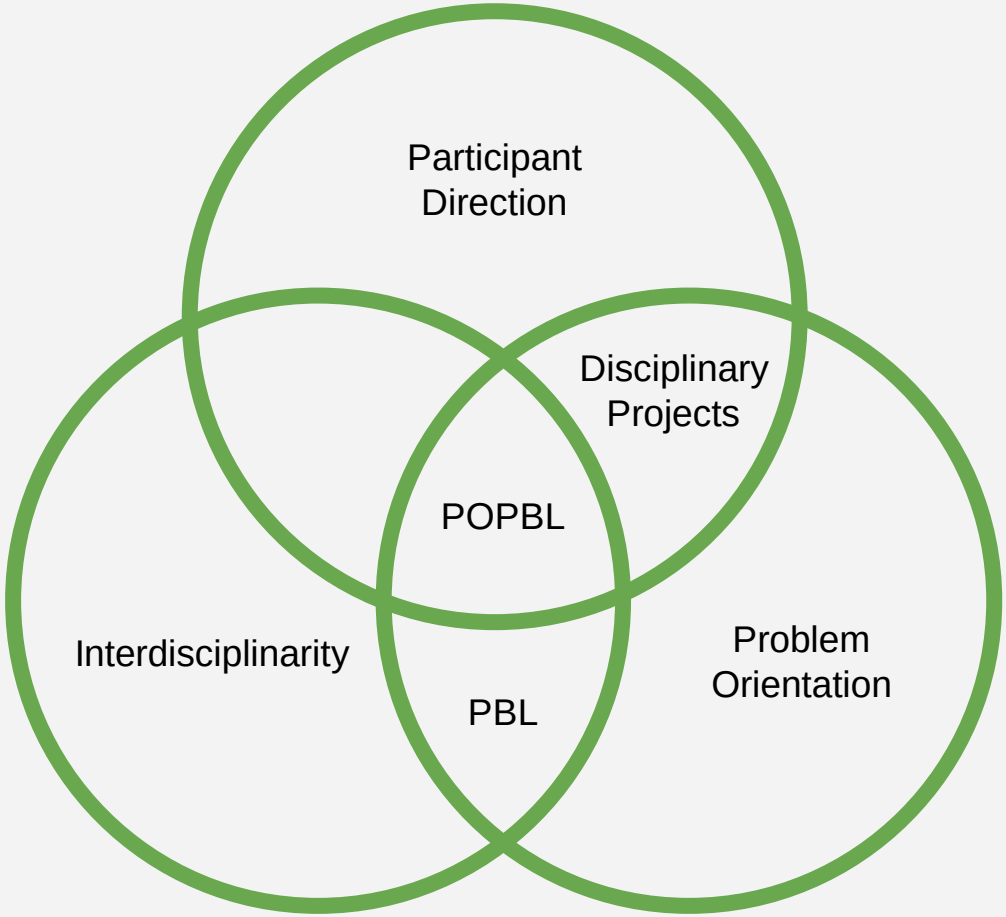
The Seven Steps



The Problem-Project Confusion

Denmark: from “Projects” to “PBL”




Participant Direction
Disciplinary Projects
POPBL
Interdisciplinarity
Problem Orientation
PBL

Features of Problem-Oriented Project Work

1. Problem-oriented, participant-directed, interdisciplinary
2. Two years of basic interdisciplinary education
3. 50% courses, 50% project work
4. The limited use of lectures.
5. Problems are defined by participants within themes
6. Problems are exemplary

The Philosophy & Psychology of PBL

Debunking Myths about PBL

PBL had nothing to do with:

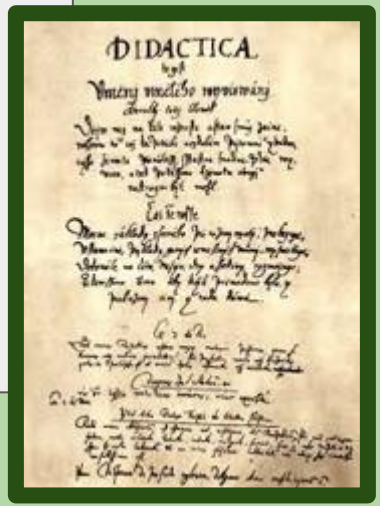
1. The Socratic Method
2. The Montessori Method
3. Confucius
4. Kierkegaard (at least not directly)
5. Rousseau

1 17th Century Humanism

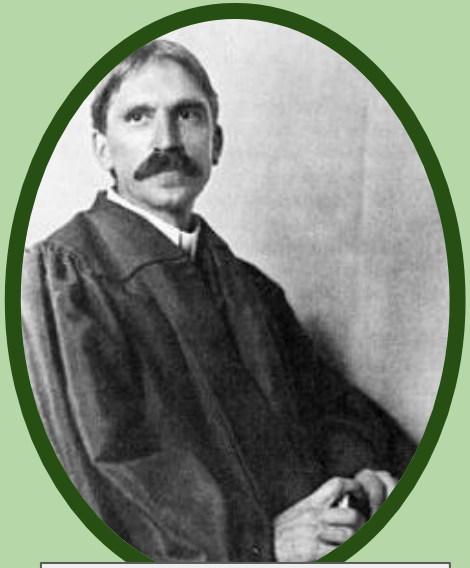
Johannes Amos Comenius
Jan Komensky

1592-1670

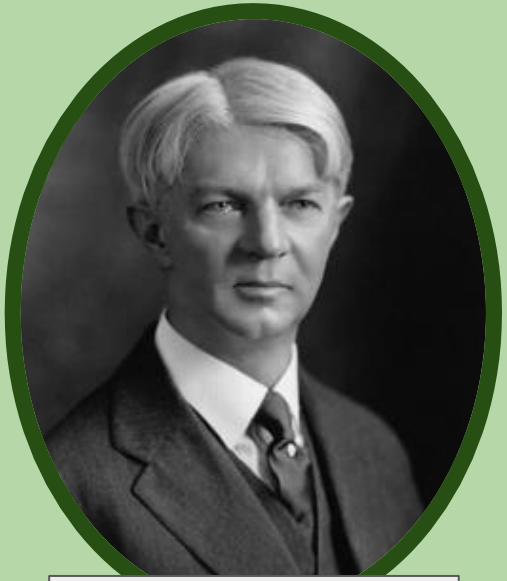
Author of the *Didactica Magna*



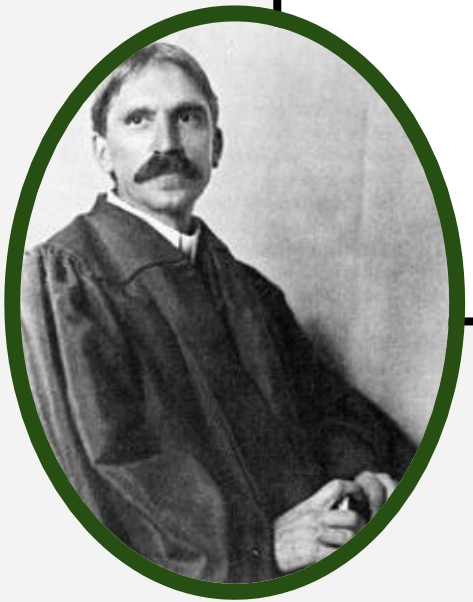
2 The Progressive Education Movement



John Dewey

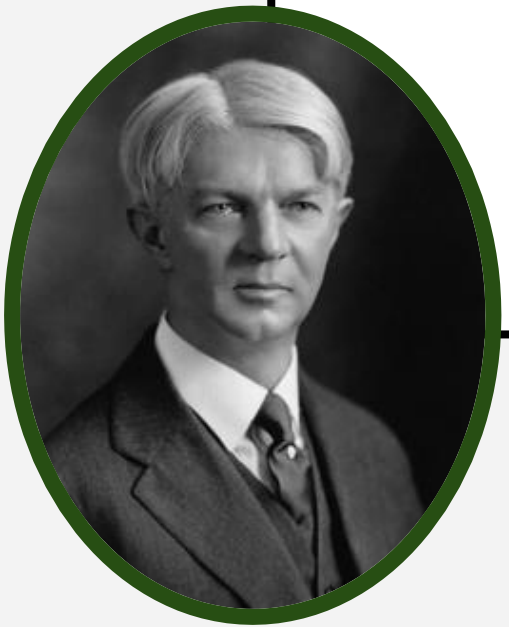


William Kilpatrick



*"The individual who has **a question** which being really a question to him instigates **his curiosity**, which feeds his eagerness for information that will help him cope with it, and who has at command an equipment which will permit **these interests** to take effect, **is intellectually free**."*

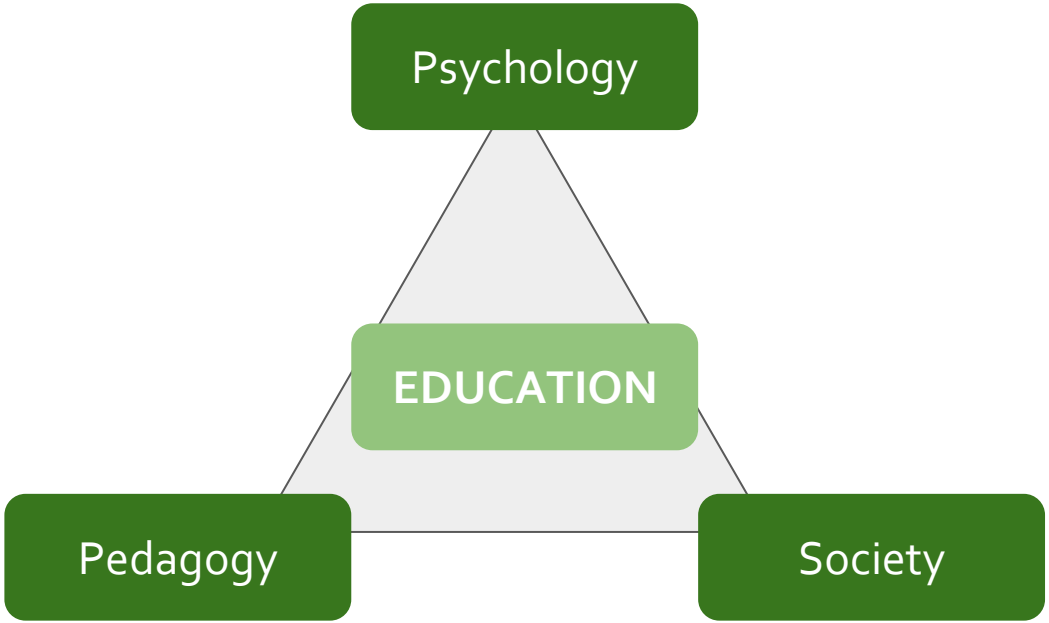
John Dewey - 1916

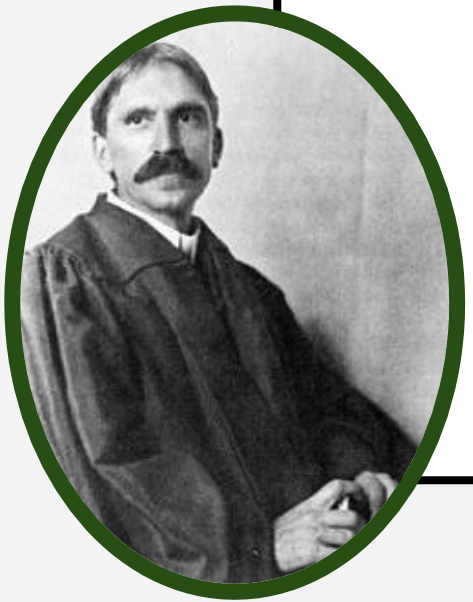


*"The teacher's success—if we believe in democracy—will consist in **gradually eliminating himself** or herself from the success of the procedure."*

William Kilpatrick, 1918

Dewey's Golden Triangle

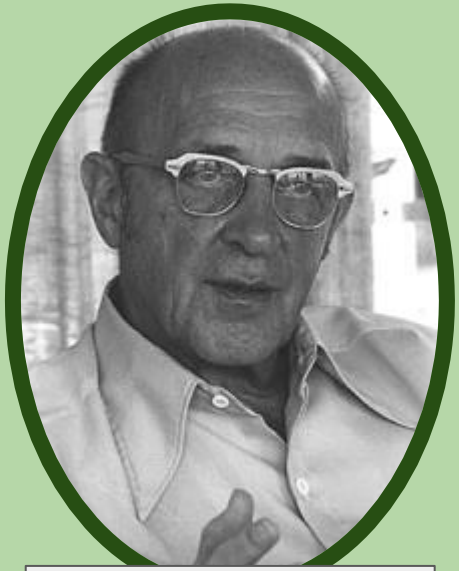




"The older type of instruction tended to treat the teacher as a dictatorial ruler. The newer type sometimes treats the teacher as a negligible factor, almost an evil, though a necessary one. In reality the teacher is the intellectual leader of a social group. He is a leader, not in virtue of official position, but because of wider and deeper knowledge and matured experience"

- John Dewey, 1933

3 Third Force (Humanist) Psychology



Carl Rogers

Abraham Maslow

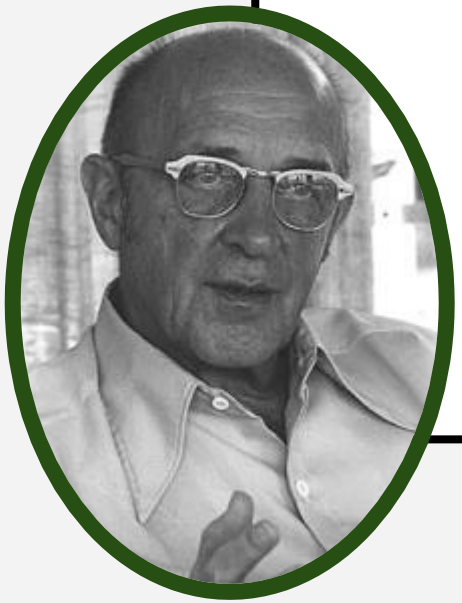
Against Behaviourism

Humanist Psychology opposed:

1. The assimilation of animal and human psychology.
2. The assumption that behaviour changes are the marker of true learning.
3. Behaviourism's disregard for human emotions.
4. The idea that there is no free will

It is assumed that you are interested in communicating certain skills and knowledge to your students and in communicating them in such a way that your students will be able to ***demonstrate*** *their achievement of* ***your instructional objectives****.*

- Robert Mager, 1962



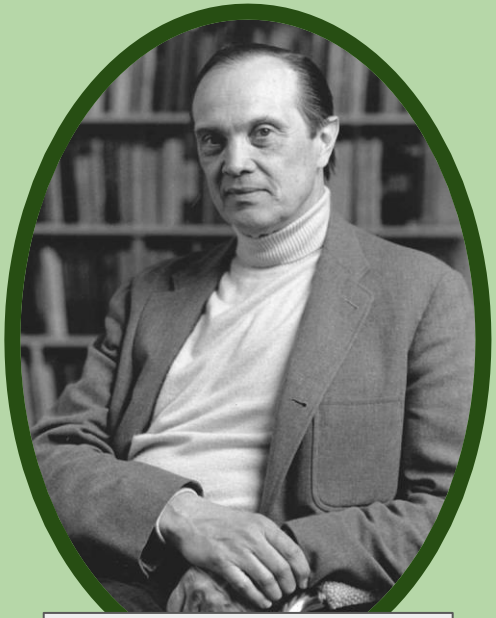
"So I have come to feel that the more I can keep a relationship free of judgment and evaluation, the more this will permit the other person to reach the point where he recognizes that the locus of evaluation, the center of responsibility, lies within himself (...). So I should like to work towards a relationship in which I am not, even in my own feelings, evaluating him. This I believe can set him free to be a self-responsible person"

- Carl Rogers, 1969

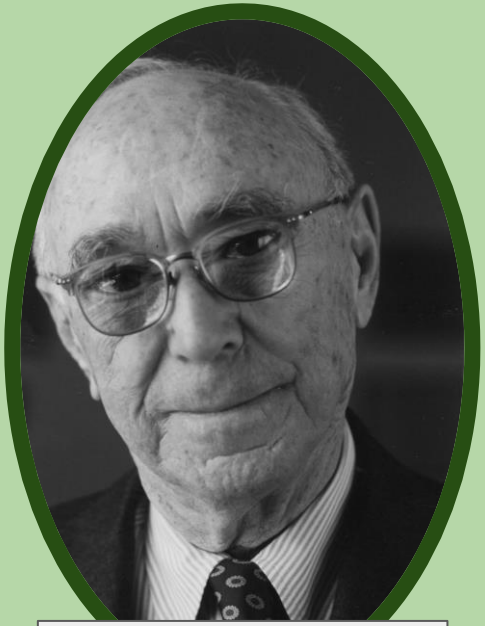
Clashing Perspectives - Guess which one won?

Educational Aspect	R.F. Mager	C. Rogers
Purpose of education	For learners to demonstrate that they can perform or behave in a certain way.	To be significant to the learner with regards to his own experience.
Person who determines what should be learnt	The instructor / "programmer"	The learner, with the guidance of the instructor.
How learning is evaluated	Through the use test questions which accurately reflect the learning objectives of the instructor.	Through an agreed evaluation plan in which the learner sets the criteria for his own learning, with the guidance of the instructor.
Determinants of success	The appropriate terminal behaviour has been achieved, according to the criterion determined for this behaviour	The learner feels that he had learnt something meaningful to him.

4 The Cognitive Revolution

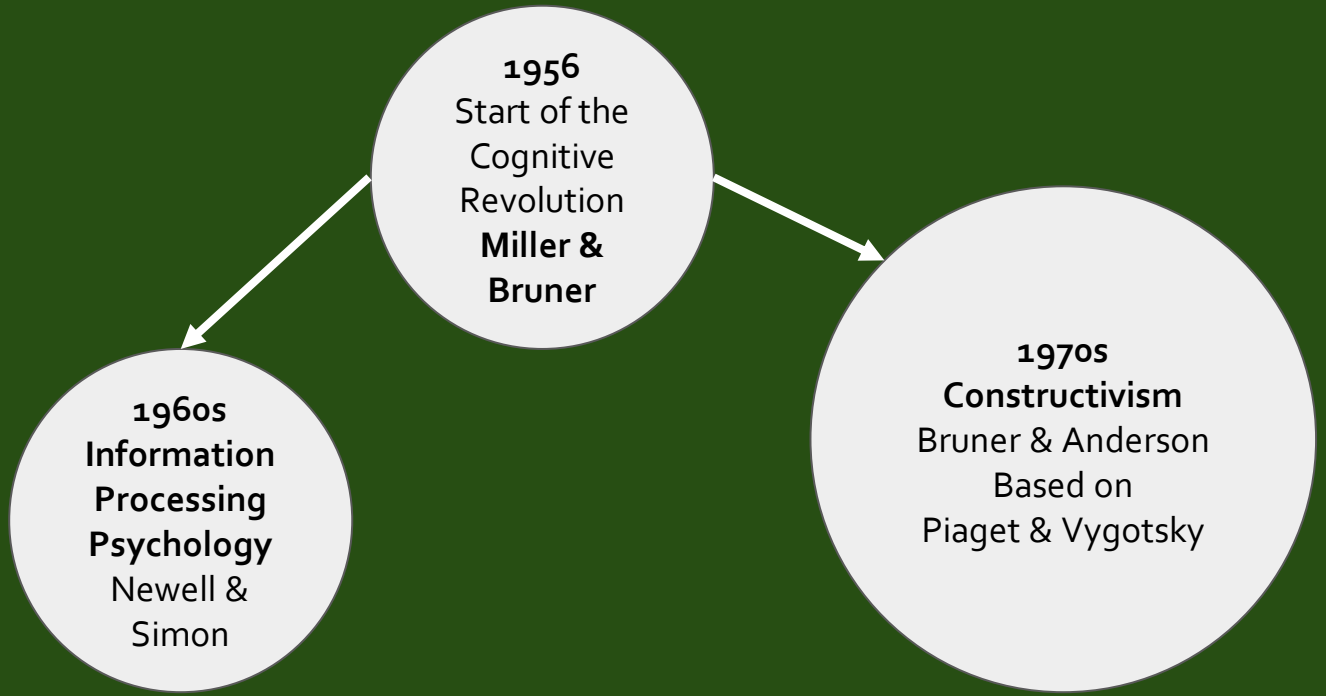


George Miller



Jerome Bruner

The Split in the Cognitive Road



PBL as Clinical Reasoning Skills

Howard Barrows believed that:

1. There are context-free problem solving skills.
2. They can be taught to medical students through PBL
3. Doctors solve problems using a process called hypothetico-deduction.
4. Learning contents is therefore of secondary importance.

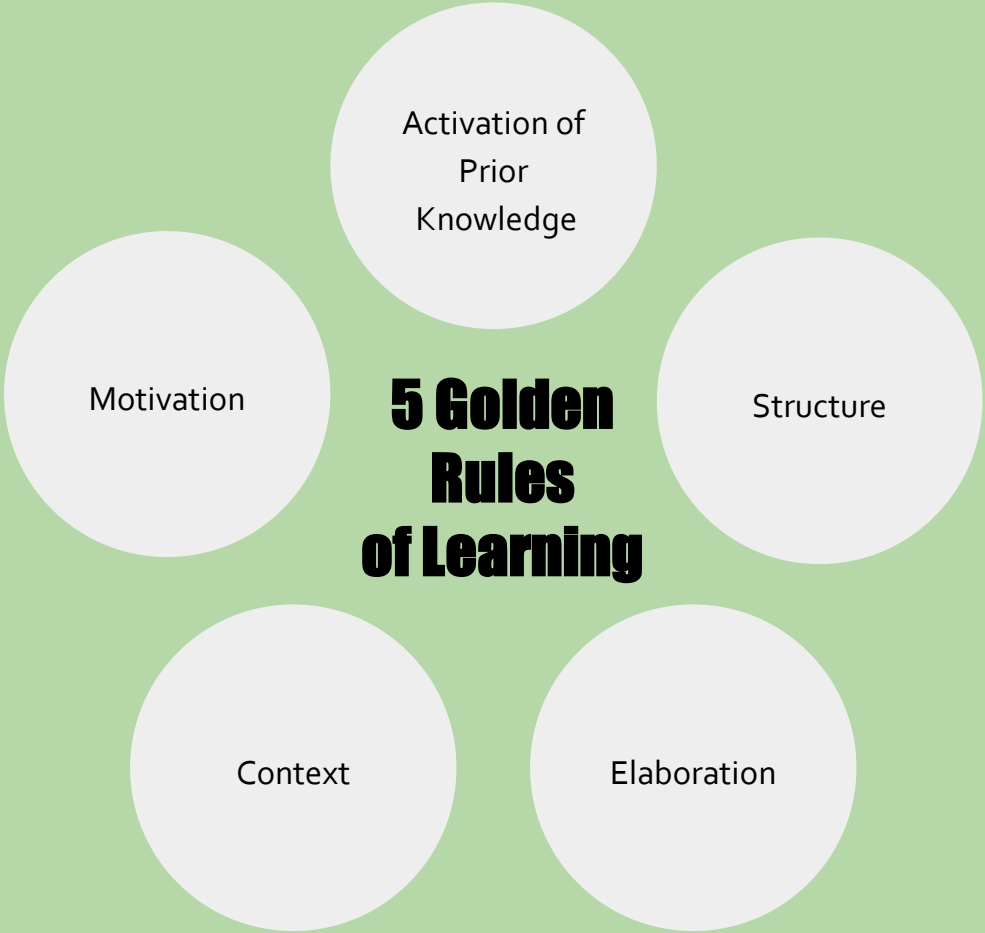
PBL as Knowledge Acquisition

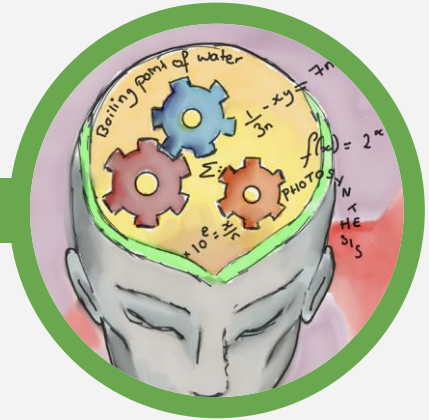
Henk Schmidt believed that:

1. Problem-solving is always bound by prior experience and context.
2. PBL can help students learn content by contextualising it and relating it to their prior experience.
3. There is no point trying to mimic professional practice through PBL.
4. Contents is of primary importance.

"I think that the difference between your work and mine is more a difference of problem-solving in terms of encoding, storage and retrieval of knowledge for use in problem-solving situations, while you focus on the process of problem-solving itself. My main interest lies in the role PBL plays in knowledge acquisition - that is why I refer with emphasis to theories of learning - while you are particularly interested in how the students use the knowledge acquired in clinical problem-solving situations".

- Henk Schmidt, *letter to Howard Barrows*, 1983


Activation of Prior Knowledge
Structure
Elaboration
Context
Motivation
5 Golden Rules of Learning

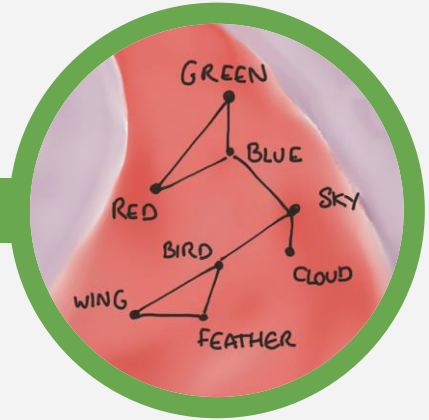


Activation of Prior Knowledge

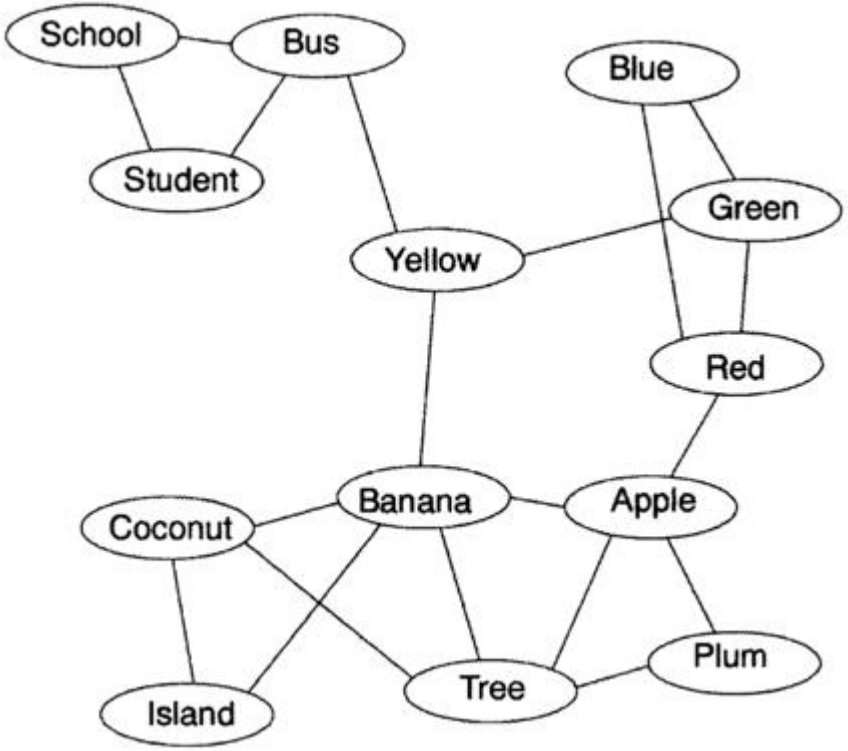
Read the Text

A newspaper is better than a magazine. A seashore is a better place than the street. At first, it is better to run than to walk. You may have to try several times. It takes some skill but it’s easy to learn. Even young children can enjoy it. Once successful, complications are minimal. Birds seldom get too close. Rain, however, soaks very fast. Too many people doing the same thing can also cause problems. One needs lots of room. If there are no complications, it can be very peaceful. A rock will serve as an anchor. If things break loose from it, however, you will not get a second chance.

KITE



Cognitive Structures

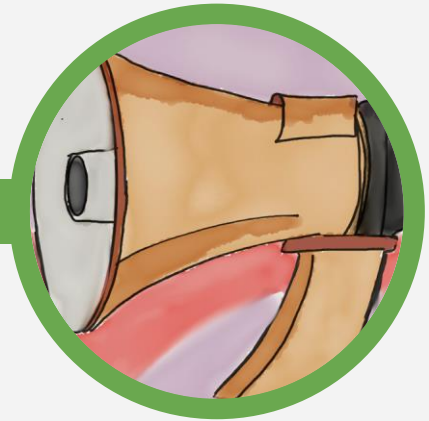

School
Bus
Blue
Student
Green
Yellow
Red
Banana
Apple
Coconut
Plum
Tree
Island

Schema Theory

CHAIR

- Wood
- Table
- Sitting
- Comfort
- Office
- Swivel

Process	Mechanism	Example
Accumulation	No prior schema	Memorizing a phone number. Learning dates by heart.
Assimilation	New knowledge made to fit in pre-existing schema.	Discovering a lion, seeing it as a type of cat, already knowing what a cat is.
Accommodation	Schema is forced to change to accommodate new knowledge	Discovering a lizard, having only ever encountered mammals.



Elaboration & Encoding

DOG

BIRD

CHAIR

MAN

BIKE

SCHOOL

FLOWER

HOUSE

Contextual Learning

Motivation

1 Self-Determination Theory

Volition

- Intrinsic motivation
- Identified motivation

Control

- Introjected motivation
- External motivation

2 Achievement Goal Theory

Mastery Goals

- Mastery Approach
- Mastery Avoidance

Performance Goals

- Performance Approach
- Performance Avoidance

Thank You

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