

# Introduction

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## Teaching vs. Learning

**Teaching is outside the head and the body;  
learning is inside the head and the body.**

This book will look at learning – what is inside the head and the body.

Let's make a simplified analogy to a computer. The brain is the hardware; the mind is the software. Learning is about the development and use of the software. Just as hardware and software must have each other in order to function, so the brain must have a mind. So must teaching and learning go together. But they are not the same thing. In order to teach, one must know what needs to go on inside a student's head. That's what this book is.

[For those of you familiar with brain research and cognitive studies, this book is a synopsis of those findings. Please do not be offended by this effort to offer the fruits of that research to a wider audience.]

# Chapter One

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## The Brain and The Mind

*It is possible to have a brain and not have a mind. A brain is inherited; a mind is developed.*

—Feuerstein

To begin our discussion, a distinction will be made between the brain and the mind. Truth be told, it is all one and the same. But for the purposes of this book, the brain is going to mean what you inherited and the mind will be what was developed by your environment. Cognitive scientists have concluded that it's about a 50/50 arrangement. About half of who an individual becomes is developed by his/her genetic code and about half by his/her environment.

All functions of the brain are either a chemical or electrical interaction. A chemical interaction occurs on the face of the cell and continues down the tail (axon) of the cell as an electrical impulse. When the electrical impulse enters the dendrites and synapses, causing their structure to permanently change, learning has occurred.

Therefore, learning is physiological. That's why it takes so long to “unlearn” something that has been learned incorrectly.

Chemicals in the brain come from four sources: what the genetic code indicates will be made, hormonal fluctuations, external experience (you get frightened and produce adrenaline), and what you eat and breathe.

This book is going to concentrate on the development of the mind. What is

## MEDIATION

Point out the stimulus (what)	Give it meaning (why)	Provide a strategy (how)
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For example, a parent says to a child:

- “Don’t cross the street without looking” (what).
- “You could be killed” (why).
- “Look both ways twice before you cross the street” (how).

This mediation builds an abstract architecture inside the child’s head. That architecture acts as an abstract replication of external reality, just as the blue-print acts as an abstract replication of a house.

In the book *Making Connections* (1991) by Caine and Caine, the authors describe two different kinds of memory functions in the brain. One is used by beginning learners (taxon), while the other is used by individuals who have more experience with it (locale).

TAXON	LOCALE
No context (experience)	Context (experience)
Memory capacity: about five things	Unlimited memory
Requires continuous rehearsal to remember	Remembers quickly but has loss of accessibility over period of time
Is in short term memory	Is in long term memory
Limited to extrinsic motivation	Motivated by novelty, curiosity, expectation (intrinsic)
Specific, habit-like behaviours that are resistant to change	Updated continuously, flexible
Isolated items	Interconnected, spatial memory
Not connected to meaning	Has meaning that is motivated by need to make sense
Acquisition of relatively fixed routes	Forms initial maps quickly and involves sensory activity and emotion; generates personal maps through creation of personal meaning
Follows route	Uses map

What this means is that a beginning learner must be mediated in order to learn. He/she must be given the what, the why and the how.

Often, in schools, the focus is on the content; the why and how are seldom if ever mentioned, so the student is unable to do the work.

Furthermore, abstractions are stored in the mind in either visual or auditory rhythmic memory. Abstractions are kept in mental models. **Mental models are in the form of a story, a metaphor or an analogy – or, perhaps, a two-dimensional drawing.**

For example, when a house is being built, blueprints are used. The blueprints become the abstract representational system for the final sensory-based object, the house.

Another example: A lawyer I know got a call from a colleague who was in court and needed a piece of paper from his desk. She said, “Your desk is a mess. No one could find it.” And he said to her, “Go and stand in front of my desk. Picture an overlay of the map of Australia. That paper is somewhere around Cairns.” And she found it. He had given her an abstract representational system.

**Mental models tell either the purpose, structure or pattern of a subject area or discipline.**

**To survive in the world of work or school, one must be able to use abstract representational systems. They are learned.**