Chapter 19

Ninety-nine Lesson Plan

Table of Contents

Before We Begin

Note: The information on brain research discussed below comes from the assorted works of Pat Wolfe.

Connections...

At birth, the human brain contains 100 billion neuron cells. At adulthood, the 100 billion cells are still in place, unless we have lost a few along the way. The 100 billion cells in the baby's brain are the same 100 billion cells in the brain of the adult—no new ones have been formed. Neurons are the only cells the body does not replace.

At birth, the baby's brain weighs about a pound. An adult brain weighs about three pounds. Since the 100 billion neuron cells have not changed—they did not grow larger to account for the increase in weight—what causes the tripling in weight? Connections. The connections formed between the neuron cells cause the increase in weight. Our brains can generate as many as one million, billion (one quadrillion) connections in our lives.

What causes the neuron network connections to be formed? Learning. Learning is an activity of the brain in which long term memory is modified through connections made. The brain forms connections between new information it receives and information already in its long term memory.

How do we get learning into memory? Through sensory input. Learning comes from new experiences, or from connections made to experiences already stored in the brain. The more experiences to which we are exposed from birth, the more connections there are available to which to link new learning as it occurs.

Rats...

One group of rats was placed in an impoverished environment. A second group was placed in an enriched environment. The rats in the impoverished environment were isolated in small single-rat cages with adequate food and water, but no other stimuli. The rats in the enriched environment lived collectively in larger cages filled with rat toys and running wheels. The enriched rats had their toys changed every week or so. They could be observed lining up excitedly, peering out of their cage at toy-changing time in anticipation of the new toys they were to receive.

The brains of each group were compared for growth. The enriched rats had heavier brains than the impoverished rats. While the number of neurons remained the same for each, the number of connections found in the brains of the rats in the enriched environment were significantly greater than the connections observed in the brains of the impoverished rats. The differences in the numbers of connections accounted for the difference in brain weights.

The differing quantities of connections made between enriched and impoverished brains was discernible after only fifteen minutes in the enriched environment. Correspondingly, rats taken from the enriched environment and placed in an impoverished one, began loosing connections, though not as rapidly as their original connections had been made.

The rats show us what we already know intuitively. From the earliest years, the environment of the child is important to his or her mental growth. The mind's growth comes from a rich and varied environment with which to interact. The more sensory information there is in the infant or the child's mind, the more there is for any new information received to be connected to. An enriched environment provides an opportunity for mental growth, but the growth may not continue if the later environment is an impoverished one.

Meaning...

What else do we know about the brain and how it learns? The brain is bombarded with new information continuously, but it does not keep all the information it receives. An adult can retain new information in short-term memory for about 18 seconds before either discarding it or storing it in long-term memory. A child's short-term memory is less than 18 seconds. For either an adult or a child to store a thought in long-term memory, a connection must be made with information already in the brain. The brain is a pattern seeking devise. What is understood will be retained. What is nonsense will be lost.

A primary factor that influences whether or not a thought will be stored in long-term memory is meaning. Anything that captures our attention and engages our minds has the potential to produce learning. But for lasting learning to take place the brain must fit the new information into an existing neuron network or memory category. The brain is always trying to make sense out of its world, continuously trying to draw meaning out of what it experiences. If no meaning can be found, then no connection can be made, and nothing enters the brain's long term memory.

What makes sense is kept in long term memory. But the strong connections of long term memory takes time to form. If the mind pays attention, and if the experience has meaning to the mind, and if the time is given for the connections to be made, then the learning enters long term memory. Learning takes time, when there is time it takes place.

Teaching others...

Long term connections are more easily made in learning situations when we have the opportunity to teach another what we know. We learn about 95% of what we teach to someone else. Teaching others gives our mind the time to transfer short term learning into long term memory. This works as well in school as it does in life.

When a faster student helps a slower one, the faster student is not being held back. The faster student is being given an opportunity to learn in greater depth. The slower student finds his or her opportunity to teach when sharing knowledge with parents or siblings at home or serving as a helper in a lower grade.

No nonsense...

We use our knowledge of how the brain works in our lessons by:

- Providing an enriched environment, not just for the early years but for every year in school. Enriched environment means each student's mind is actively involved in the lessons that we teach. Enriched also means an environment that is non-threatening.
- Focusing on understanding and on using what is learned. Our brains form connections from what captures our attention and engages our mind. Meaning captures our attention. Nonsense is rejected.
- Connecting learning to what has gone before or creating new sensory experiences to place learning in the child's mind.
- Allowing students to make their own sense of information and to generate their own examples. We cannot pass a single neuron connection in our minds to the mind of any student in our class. Each mind must build its network of connections for itself.
- Allowing time for concepts to be absorbed. The more any particular set of neuron networks is in use, the stronger its connections become and the more readily accessible is the information stored.
- Making written expression a part of the curriculum. The act of writing, when it involves imagination and creativity, causes the brain to process the information more in depth. If children cannot yet write, drawing pictures to illustrate a point also allows the mind to process information in depth.
- Reducing the number of concepts introduced, to give each concept longer to be absorbed. Depth of knowledge is more beneficial to a student than knowing very little of a lot.
- Giving every student the opportunity to teach or to explain what he or she knows. Teaching or explaining insures the time for long term connections to be made.

Some students have better memories for nonsense because the experiences they carry within their minds have provided them with a greater range of images with which to make connections. They can literally make sense out of nonsense. However, "some students" does not meal all, and the learning of every child is our goal. To guarantee every child learns, what we teach must make sense to all. Making sense out of nonsense is not a requirement in our class.

A guide and nothing more...

There are ninety-nine lessons in this book. The lesson content spans kindergarten through sixth grade. Not every lesson is for use in every grade. What follows are sequences that suggest the lessons we might use for our grade. No matter what level we teach, it is not important that we cover every topic on our grade's list. There is no page or lesson quota that we must meet. We learn from every lesson we present what our next lesson needs to be. If we decide our first or third or fifth grade class needs something not on our grade's list, we teach what we know our students need to learn, independent of any item on the list. If we think our students should learn arithmetic concepts sooner than our list suggests, our judgment sets our priorities, not the list. Our goal is that our students understand. The lesson sequences which follow are guides to help us reach our goal and nothing more. The actual plan we follow is for us to decide.