The futurist thinker Dr. Jonas Salk, American medical researcher and virologist, is best known for his discovery of the first safe and effective polio vaccine. In 1963 his dream of a research complex for the investigation of biological phenomena was realized as the Salk Institute for Biological Studies. When asked about his hopes for the institute, he stated "In the end, what may have more significance is my creation of the institute and what will come out of it, because of its example as a place for excellence, a creative environment for creative minds." He hoped to create an environment in which the scientists would be free to cultivate their own creativity to the fullest. To that end, in anticipation of spontaneous Socratic and curious moments, Louis Kahn, the architect, had black-boards installed along the walkway walls. It very well may have been his personal experience in the creation of, and subsequent work at the institute, that prompted Dr. Salk to propose to the American Architecture Foundation, that someone from the field of architecture should be looking at the scientific correlation between architecture and human experience.

We at The LKA Partners propose that the new “frontier” for educational facility planning will be to explore the possibilities of the building itself playing a direct role in pedagogy. Not merely a backdrop and support, containing the typical necessities for habitation, but an active participant in the learning process. We believe Dr. Salk was correct in his assertion. Neuroscientists now know that the environment plays an important role and dramatically influences the development of the brain from the very early stages to a full-grown organ. It has recently become clear that the nature of the brain is not static, that is, through experience an increase and decrease in neuron activity can occur, and due to environmental interactions a change in the total number of neurons can also occur. Fred Gage of the Salk Institute states:

"Architectural design can change our brains and behavior. The structures in the (built) environment – the houses we live in, the areas we play in, the buildings we work in – affect our brains and our brains affect our behavior. By designing the structures we live in, architects are affecting our brains. The different spaces in which we live and work are changing our brain structures and our behaviors, and this has been going on for a long time."

Neuroscientists believe there are critical development periods in brain development where growth and pruning most likely occur, and that children could be susceptible to the affects of environmental experiences during these periods, which may cause “experience-dependant” development. For example, environmental stimuli, such as light and sound, are understood to influence brain development. The external world demands constant adaptation from a child’s brain, and in a plastic-like fashion it is being effectively changed by events and stimuli. Now, consider the following points related to brain development as presented in a UCLA Brain Development brief by Halfon, Shulman & Hochstein:
- A newborn has about the same number of neurons as an adult, but only 25% of its brain volume has developed. Infant’s brain cells are connected by some 50 trillion synapses.

- By age 3, the synapse number on average is 1,000 trillion. Beginning at age 3 the synapses are selectively eliminated. At age 15, there are 500 trillion synapses left, a number currently thought to remain steady thereafter.

- Functions like heart rate area relatively hardwired at birth, whereas higher functions related to learning and memory are sculpted and modified by experience — however the exact network of connections changes over time.

- Synapse survival is use-dependent. External stimuli and synaptic firing under the influence of new types of stimuli lead to synapse formation and neuronal survival.

- It is believed that brain regions become connected with others and form functional pathways in a hierarchical fashion, enabling increasingly complex behavior.

There can be no question that the built environment is ripe with stimuli for the developing brain, both positive and negative. We at LKA believe this begs the question; shouldn’t we be paying more attention to the stimuli we are creating in school facilities, and purposefully attempt to create an environment that influences the developing brain in a positive way? The answer of course is yes and LKA believes this should be our mandate as educational facility architects.

We are not neurologists, educators or “learning scientists” – just architects! However, our design specialty is educational facilities. For more than four decades we have attempted to keep abreast of the trends in education so that as we engage our clients we can have a better understanding of the nature of their “business”. By understanding the goals of our clients and the philosophical basis from which their goals have grown, we believe we can be better architects and more creative in our solutions. Consider a road map as a metaphor, and a student's educational life a journey to be mapped. If we have only minimal information about the intended journey, the map will be very simplistic and inflexible. On the other hand, if our clients share with us the intended experiences, possible “side-routes” for exploration, significant stops along the way, important milestones of accomplishment, how the students will be outfitted and led on their journey, we can be very creative and create a map full of possibilities. This is our principal approach to every project. To engage our educator clients in such a way as to learn all we can about their vision for their student's journey. Then create a facility that is full of possibilities for the road ahead.

As stated previously, we believe the new “frontier” for educational facility planning will be to explore and develop facilities that play an active role in pedagogy. This belief may be unique to LKA at this time. While there is much discussion about the affects of school facilities on achievement and overall academic outcome, they tend to still fall into a passive category. For example, such things as sustainable (green) design, energy efficiency, indoor air quality, ventilation, climatic comfort, acoustics, lighting, school & classroom size, and building quality. These are all important but still have more to do with how a building should be built than what should be designed and why. So we believe it is time to step back and ask who is the building for, what needs to be experienced in the building, and why is it important. We have seen many educational facilities over the past several years that have performed well with regard to sustainable design and energy efficiency but have neglected sound educational planning.
The users of these facilities are in essence being required to adapt their pedagogy to fit the facility. This is unacceptable; both problems deserve proper attention and a comprehensive solution. At this point in time we have the opportunity to create school facilities that include elements of sustainable design as well as foster and even influence better learning.

Many school buildings are being built very similar to schools of the 1950’s. They are still being designed and built to an adult scale. The windows are too high and the doors too heavy. The materials are often cold, hard and unfamiliar to a young child. The spaces are large, formidable and ordinary in their geometry. Wayfinding can be very intimidating for a young child in such a large setting. There are no nooks or interesting places that draw the student in. The colors often reflect an adult perception and meaning. Even the typical tackable wall panel used to display the students work is located between 4-feet and 7-feet above the floor, while the average height of a fifth grader is about 4-foot 8-inches.

Consider the following example of how we at LKA believe the design process should occur. We start with a well recognized educational philosophy, Howard Gardner’s Multiple Intelligences theory. Now almost 27 years old, his concept of what is typically referred to as “Learning Styles”, is very mainstream in educational circles. In fact many architects now of this concept as well. Thus far, the learning styles have been understood to reside with the student, like having their own learning language. When information is presented in their language it is more easily assimilated and understood. The styles of learning will be present in any environment because they are possessed by the student. The illustration (above right) represents the various learning styles.

How then does an architect transcend the abstract concept of “Learning Styles” to something material and physical? After learning about the concept from our educational client we explore and imagine how a student might experience those abstracts. The ancients believed that meaningful life can be measured by these four characteristics; spirit, mind, body and soul. To experience life and our humanity is to be aware of how we are affected in these four realms. Interpreted with post-modern concepts they are; emotional, environmental, sensory and physical. By creating the right environment these realms of human experience can be realized and enhance the learning experience. An environment that is focused and centered on the learner will recognize this and foster the right combination of experiences. Therefore, visualize the abstract learning concepts overlaid by human experience, as shown in the illustration above.
Next is to interpret this in tangible terms; what does this look like in the physical environment? To that we say “Welcome Home”. Consider the quintessential home in the illustration at right. In a home environment the student is already accustomed to learning in various ways. Whether preparing a meal with parents, playing a board game with siblings and friends, listening to music, reading a book in the window seat or climbing a tree; these are all experiences involving different learning styles. This is the beginning of understanding for a new style of “classroom”. So what should a “classroom” be like?

It may want to be, “Just Like Home”. Following this method of design philosophy we are following and creating a pathway that is familiar to the student and is “organic” to their understanding. By focusing on the learner, classroom design will move away from the “cells and bells – one size fits all model.” Recognizing the various learning styles and modalities that benefit the student/learner, a variety of configurations and environments will be required . . . just like home.
The new classroom or “learning studio” will allow interconnection, varied student group sizes and multiple simultaneous student activities. Teaching can become less isolated and more collaborative. The teacher can manipulate the environment to create new experiences for the students. Learning will become more personal, cooperative, experiential and project based. See the illustration above.

In conclusion, we hope we have made a compelling argument for re-evaluating the manner in which we design educational facilities. You will find as you continue to read through this submittal that LKA has a tremendous history and long list of successful educational facility projects. Over the past forty plus years those projects represented the contemporary thinking of their time. We believe today we are on the brink of yet another positive paradigm of educational design methodology.