Memorization & Learning – As different as what & why

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Memorization and learning are two very different things. As I look back on my own education, both formal and real life, most of the facts and figures that I memorized are long gone. Even today, routine details seem to slip in and out of memory based upon how often I use them. In contrast, the majority of the things that I truly learned are still with me. They may need a bit of jogging here and there but, for the most part, they can be resurrected in amazing detail. I am sure this is why I became interested in science and, particularly, physics. Physics is the basis for all the sciences and is at the core of engineering. It is not merely a collection of facts, but rather a method of learning. To be sure, some degree of memorization is required but most of what we memorize is used over and over again as building blocks in the learning process. Like the random facts we deal with daily, important equations will sometimes slip away. But, their understanding remains vivid and they seem satisfied to hide quietly until they are needed again.

To me, the difference between memorization and learning is the difference between "what" and "why". "What" tends to look for a quick and dirty fact to explain a process. "Why", on the other hand, tends to delve deeper and attempts to explore the basics surrounding the process. Knowing that a process occurs is of limited value. Understanding why a process occurs not only explains it, but also provides us with a pathway towards the understanding of related processes.

The two paragraphs above comprise the introduction to the "Puzzler" series that I developed in the late eighties for my weekly, employee training sessions. It was patterned after the one presented by the "Tappet" brothers on the popular radio show "Car Talk". My weekly Puzzler posed a question about pumps, motors and controls and my employees had a week to think about it and research it. The following week they presented their answers and the reasoning that gave rise to those answers. Its entire purpose was to promote learning rather than memorization.

Pump system training can be both rewarding and frustrating. I wish I could say that most of my seminar audiences follow the 80/20 rule - - 80% are truly interested and the other 20% are just there for the education credits. But it is more often 60/40 and I have done a few where 40/60 was the norm. I find it frustrating that so many of us do not realize that a thorough understanding of subjects related to the tasks we perform can help us do our job better. Are we lazy, not very smart or do we just not care? I believe that it is due, in part, to a very different public school education system than the one I experienced back in the fifties and sixties. If you would like to see a comparison of my take on education then and now, download "Why Newton Invented Calculus" from my website. Even college students who major in mechanical and civil engineering receive little or no education on pump hydraulics. That is why I spend a lot of my time educating young engineers on this topic. On the other hand, it is very rewarding to have a student ask a seemingly unrelated question after a class. But, in reality it was not unrelated. What he or she learned in the class allowed them to apply it to very different but related process.

Some tell me that I present too much pump theory but I believe that a fundamental understanding of what goes on inside a pump is necessary if we are to select, operate and maintain that pump properly. Otherwise we tend to follow Einstein's definition of insanity and do the same thing over and over again while expecting different results. Unfortunately, some pump users and politicians have a lot in common! Two examples of theory that are also very practical are Specific Speed (Ns) and Suction Specific Speed (S). Many believe that Ns and S are the stuff of design engineers but they are great indicators of potentially dangerous conditions. Ns can predict the radial forces that can cause premature shaft, seal and wear ring failure. S provides us with the safe operating window that can prevent the onset of suction recirculation and the resulting cavitation. Both of these "theoretical" values are critical to pump selection and allow operators and maintenance personnel to recognize potential problems in existing installations. There are many, many more.

A thorough understanding of pumping systems is the goal of Pump ED 101 and I will continue to pound you with these "theoretical" but very practical subjects. I wish all of my readers a very merry Christmas and a happy and prosperous new year. Unfortunately, this column was edited prior to the election so it is difficult to predict how prosperous 2013 might be!

Joe Evans is responsible for customer and employee education at PumpTech Inc, a pump & packaged systems manufacturer & distributor with branches throughout the Pacific Northwest. He can be reached via his website www.PumpEd101.com. If there are topics that you would like to see discussed in future columns, drop him an email.