Editorial – Theory Testing Research versus Theory-Based Research

What is the role of theory in educational research? Regretfully, it seems to me that, to paraphrase Winifred Castle, a British statistician:

“Most educational researchers use theories the way a drunkard uses a lightpost. More for support than illumination”.

I recently attended a conference where a qualitative researcher was studying the use of pictures to promote dialogue. In the course of her presentation, she mentioned several theories which were used to “guide” her inquiry, to “provide a framework” for her investigation, to “furnish a conceptual basis” for her research, and so on. As I listened to the convoluted tale unfolding, bouncing back and forth among aspects of the several theories which were marshaled one after another to support her approach, I kept waiting for a test of these theories – some evidence to decide whether they were right or wrong. This never happened. The theory wasn’t there to be tested; it was there only to show her where to go looking in the morass of detail she had accumulated. It was only later, when I read a copy of the paper, that I found that the entire paper was based on a single, 20-minute discussion between two artists.

It dawned on me that she was using theories in a way that was completely foreign to me. Coming from a background in physics, I was accustomed to using experiments to test theories. You had a theory about how some corner of the world worked; you reasoned that if the theory was correct, then if you did such-and-such, so-and-so should happen to this variable. No question that I, too, was using theory as a basis for deciding on what variables to look at. But a critical difference was that in the natural sciences, and in the work I do now, there is an interplay between theory and experiment – theory informs you of critical experiments, and findings from experiments permits modification, acceptance or rejection of theory. By contrast, she used theory to guide her study. She did not worry about the possibility that different theories might lead to different ways of explaining the data, forcing her to choose one over the other. And when she was done, the results of the study did not lead to any accepting or rejecting of any theory.

This study is not alone. A few years ago I decried the phenomenon that “adult learning theory” appears to be used more as an excuse to gain scientific credibility for particular kinds of educational strategies than as a world description to be tested by experiment (Norman, 1999). Far too often,
I have heard the refrain: “This educational approach was designed consistent with the principles of adult learning theory”, apparently in order to give the particular strategy a veneer of scientific credibility. Even when educational researchers do gather data to test a theory, they tend to go for data that will support the theory, but cannot of itself falsify the theory, forgetting Popper’s (1959) admonition that theories can only be falsified. Indeed, McGaghie’s paper on concept mapping in the present issue shows that by getting experts to rate similarity among concepts, one can generate concept maps which purport to represent the mental organization of knowledge. But as Schmidt points out in the Reflections in this issue, while the data are consistent with concept maps as a mental representation, they cannot be used to conclude that concept maps are THE mental representation of experts.

What difference does all this make? I think a great deal. To me, the essence of science is to identify regularities in nature so that we can predict how future events, observed under particular circumstances, will unfold. At one level, it really represents an extension of everyday cognition. When we throw a ball in the air or guide a car around a corner, we can, because of our experience, pretty well predict where it (the ball or the car) is going to go. But this only works because we have acquired the relevant particular experience. If the ball was thrown on the moon, or we were behind the wheel of a Mack truck, we would be in much more difficulty getting it to go where we wanted it to. However, if we really wanted to predict what would happen, Newton’s laws would do a fine job. The reason I can say this with confidence is because Newton’s laws have been subjected to experimental testing and shown to work well with little toy cars and big spaceships, on the earth or the moon or anywhere else in space. It’s only when you get very close to the speed of light or the mass of a black hole that they aren’t quite so good.

I can imagine that at this point, a number of readers are concluding that I have just revealed myself as the last of the logical positivists. I don’t think so. And I think the distinction is important. Positivism, the notion that all of scientific law could be deduced from objective observation using only the rules of logic, was overthrown by philosophers of science like Kuhn and Lakatos in the mid-20th century. They noted that scientific facts are not theory-free. The particular factors, or observations, that we choose to focus on are dictated by theories. But they went further, in two respects. First, they rejected any claim to universality of any theory, and continued Plato’s logical paradox that no claim to universality (All swans are white) can ever be proved, and therefore as Popper claimed, theories can only be disproved. A consequence of this position is that any kind of generalization is suspect, and one can only hope to give a valid description of the observed phenomena. In that respect, the example above, focusing on 20 minutes in the life of two artists, is as scientifically valid as a cholesterol-lowering trial involving 4000 patients and 10 years (Tyroler, 1984). Finally, Kuhn, in his early radical