Hugh G. Petrie
Blind Variation and Selective Retention

An intellectual autobiography

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Over 50 years ago I sat in the living room of my home in a small town in Colorado where the Dean of Admissions of the California Institute of Technology was interviewing me for freshman admission to their engineering program. As we spoke, the dean said that many intelligent students in small town high schools gravitate toward science and mathematics courses, since these are often the only ones that are intrinsically interesting. Without excellent teachers in the humanities and social sciences, such students may not realize the intellectual attractions of those fields.

A "Broad" Undergraduate Education

I was ultimately admitted to Caltech and MIT as well as to the University of Colorado. Because I was awarded a very generous scholarship to Colorado, I enrolled there, but, heeding the words of the Caltech dean, I naively thought I would expand my horizons by entering a joint five-year engineering and business program! It was the beginning of blind variation and selective retention although I could not have put those words to it at the time.

Fortunately, after my first two years at Colorado I discovered that I could also sit in on general honors courses, and eventually, I became the first engineering student at Colorado to enroll full-time in that program. In my first honors seminar, I read Descartes. "Cogito, ergo sum!" Wow! That dean was right; there was a whole new intellectual world in the humanities. By then, however, I was so far along in my applied mathematics and business studies that I decided simply to finish them rather than shifting at that time to my newfound love of philosophy. My advisors also told me that since analytic philosophy was the intellectual fashion of the day, my work in mathematics would stand me in good stead. I received a Fulbright Fellowship to Manchester University to study mathematics and philosophy for a year and then I took up Woodrow Wilson and Danforth Fellowships to study philosophy at Stanford.

Linguistic Analysis

As befitted the vogue in philosophy in the early 60's, I was thoroughly indoctrinated at Stanford into the reigning forms of linguistic analysis. However, I had always been interested in educational issues, and, in particular, in how we learn and come to know what we know. I gravitated to epistemology in my studies and I was particularly influenced by Israel Scheffler's *The Language of Education* (1960). Scheffler's later book, *Conditions of Knowledge* (1965) was copyrighted the same year as my doctoral dissertation, *Rote Learning and Learning With Understanding*, and the philosophical resonance between the two is really quite remarkable.

At Stanford, I also established a relationship with Larry Thomas, the senior philosopher of education at Stanford's School of Education. I was able to assist him in a couple of summer courses in philosophy of education (a bit more blind variation).

Evolutionary Epistemology and Perceptual Control Theory

Following my doctoral work at Stanford, my first academic position was in the philosophy department at Northwestern University. There I made the acquaintance of Joe Park, the philosopher of education in the School of Education, who encouraged my early research and writing in philosophy of education, mostly an elaboration of the analytic epistemological themes drawn from my doctoral dissertation (Petrie, 1968, 1969, 1970).

It was also at Northwestern that the major influences on my intellectual development occurred. During my first year as an assistant professor, I was visited by Donald Campbell, the social psychologist, innovative social science methodologist, and "closet" philosopher of science. It is from Campbell's work in evolutionary epistemology that I have drawn the title, "Blind Variation and Selective Retention," for

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my contribution to this volume. That phrase, as I will elaborate in what follows, sums up not only my intellectual autobiography, but also my views on how we come to know what we know.

Campbell was going on sabbatical during my first year at Northwestern, but he had heard that the philosophy department had hired an epistemologist and philosopher of science, and he wanted to ask me to co-teach a standard course he offered the next year when he returned. The course was entitled, "Knowledge Processes," and I said I would be happy to do so as long as my chair agreed. (Interestingly, it was this experience with Don Campbell that later encouraged me as a dean to encourage joint teaching experiences by my faculty, even if it didn't quite constitute a "regular" teaching load.)

It was during that course that I was first introduced to Thomas Kuhn (1962), Stephen Toulmin (1963), Karl Popper (1965), N. R. Hanson (1958), and, of course, to Donald Campbell. In the course, I read early drafts of his landmark "Evolutionary Epistemology" (1974). However, it took me awhile to selectively retain all the wonderful blind variations I was introduced to during that course. In fact, as a newly minted Ph.D. (does anyone know more than brand-new Ph.D.'s?), I was amazed that this well-known and highly respected full professor could be making so many elementary epistemological mistakes; mistakes that I had learned to refute during my graduate studies in analytic philosophy. So we had a number of robust discussions in the course about the theses Campbell was presenting. The students, quite naturally, loved the back and forth between the professors. After several months of Don Campbell's patient explanations of his position and questioning of my arguments, I began to think that maybe this full professor knew more than I had originally assumed. By the time we co-taught the course several times in the following years, I was beginning to see the outlines of how evolutionary epistemology might just be able to solve some of the continuing vexing philosophical questions of how we know and how we come to know. Over the years, I continued to keep in touch with Don Campbell and read all that he published on evolutionary epistemology.

The other major influence on my intellectual development also occurred at Northwestern, and, once again, was the result of blind variation and selective retention. The blind variation came from my attending a series of informal luncheon get-togethers organized by Don Campbell. At those luncheons, I made the acquaintance of William Powers. Powers was a true iconoclast. He earned his bachelor's degree in physics, and then enrolled in a doctoral program in psychology to pursue his interests in the connections between certain engineering concepts and human behavior. He left without finishing his degree in psychology in disgust with the reigning behaviorist ideology in psychology.

When I met Bill Powers, he was working as an engineer at a research facility at Northwestern and attempting to pull together his insights into human behavior into a book. At several of our luncheon meetings, he gave demonstrations of what he came to call Perceptual Control Theory. These demonstrations served both as striking refutations of stimulus-response psychology and as incredibly compelling illustrations of Perceptual Control Theory. (For the interested reader, some of these original demonstrations, others developed later, and a general introduction to Perceptual Control Theory can be accessed at www.livingcontrolsystems.com. Also see Powers (1998) for a basic introduction to Perceptual Control Theory.)

I was fascinated by this initial brief exposure to Powers' work and I determined to learn more about it and to try to give it a broader exposure. Consequently, I asked him to co-teach a graduate seminar with me on his work. Only about a half dozen Northwestern students signed up, but it was a mind-bending experience for all of us. Bill had us read draft chapters of the book he was working on, showed us many more demonstrations, and engaged us in the most exciting intellectual experience I had ever had. Those chapters later became his seminal book, *Behavior: the Control of Perception* (1973).

Linguistic Analysis

My earliest work at Northwestern was still largely influenced by my doctoral training in analytic philosophy. Even in these writings, however, there were glimmers of the more full-blown emphasis on conceptual change, knowledge acquisition, Perceptual Control Theory, and a naturalized, evolutionary epistemology which came to dominate my later work. In "The Strategy Sense of 'Methodology'" (1968), I used the language of logical analysis to argue for the importance of the processes of obtaining knowledge and not just analyzing states of knowing or knowing how. In "Science and Metaphysics: A Wittgensteinian Interpretation" (1971a), I was already propounding

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the continuity of science and philosophy, as opposed to the linguistic analysts who held that philosophy was all about grammar. This lengthy book chapter used that paradigmatic linguistic philosopher, Wittgenstein, as a source for hints as to what I and others later came to call naturalized epistemology.

Don Campbell's influence was already apparent in another one of my early papers still couched primarily in the idiom of logical analysis. "A Dogma of Operationalism in the Social Sciences" (1971) argues that the behaviorists' beloved concepts of reliability and validity as exhibited in operational definitions are actually relative to what we take as an observation language. Contrary to the beliefs of most behaviorists, it is simply unsupported dogma to believe that there is some a priori set of observational terms, e.g., atoms of behavior, to which we can always unproblematically refer.

Naturalized Evolutionary Epistemology, Conceptual Change, and the Theory - Ladeness of Observation in Educational Philosophy

In 1971 I moved to the School of Education at the University of Illinois at Urbana-Champaign as a philosopher of education. By then my work was beginning to reflect not only the influences of my time at Northwestern, but also my increasing interest in setting my work in educational contexts. Following my linguistic analysis phase at Northwestern, four major substantive themes emerged in my scholarly writing while at Illinois. Some of these were prefigured in my early work, but they only began to emerge full-blown after my move to Illinois. The first theme is the constellation of topics encompassed by a naturalized evolutionary epistemology, conceptual change, the theory-ladeness of observation, and critiques of behaviorism, especially as used in education. Second, my work in the epistemology of interdisciplinary inquiry also grew out of these topics. Third, my investigations into metaphor provide the key to understanding how conceptual change is possible and why metaphors are of such paramount importance to learning. Fourth, Perceptual Control Theory as an analysis of human behavior explains how entities control what happens to them and illustrates the relationships between actions and goals, perceptions and actions, and perceptions and reality. Furthermore, Perceptual Control Theory does so within a single, testable concept of how living systems work.

The Theory-Ladeness of Observation

"Why Has Learning Theory Failed to Teach Us How to Learn" (1968) applies the relativity of observational languages to stimulus-response learning theorists on the one hand and educational practitioners on the other. The former use behavioral observational categories and the latter mentalistic action categories. The two camps pass each other in the night. "Theories Are Tested by Observing the Facts: Or Are They?" (1972), expands considerably on the learning theory article. In particular I argue there that non-behavioral approaches in educational research cannot simply be ignored and that an eclectic "functionalism" in educational research is bound to try to compare apples and oranges and, hence, end up being incoherent. Only fully articulated Kuhnian paradigms can fruitfully be compared in terms of educational research. "Can Education Find Its Lost Objectives Under the Street Lamp of Behaviorism?" (1975), applies the lessons of "Dogma" (1971) to a thoroughgoing critique of the educational policy of utilizing behavioral objectives as the panacea for all, or almost all, educational ills.

Interdisciplinary Inquiry

Perhaps my best-known, and most reprinted, article relies heavily upon the theory-ladeness of observation. Early in my career at Illinois, I was invited to join a group of engineers, natural scientists, social scientists, and humanists who were funded by the Sloan Foundation to explore, in an interdisciplinary way, the role of the social sciences and humanities in an engineering curriculum. The method was to hold interdisciplinary seminars of all the faculty participants. Each seminar was led by an expert in a different discipline, engineering, humanities, social science. The faculty member of the moment attempted to answer the question, "How does my discipline view the world?" If ever there was a real-life exploration of the theory-ladeness of observation, this was it! It formed the impetus for my work in the epistemology of interdisciplinary inquiry and led to my most widely republished paper, "Do You See What I See? The Epistemology of Interdisciplinary Inquiry" (1976a). In this paper, I argued that truly interdisciplinary inquiry can proceed only if there is at least a rudimentary understanding of the observational categories, and, hence, theory, of the various disciplines involved. This explains why interdisciplinary work is so hard. You almost have to acquire a new discipline. A later reflection on interdisciplinary education can be found in "Interdisciplinary Education: Are We Faced with Insurmountable Opportunities?" (1992a).

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Metaphor

So, are we faced with insurmountable difficulties because we have to learn the concepts and observational categories of the new discipline? Not quite. From the seminars, I learned that well-chosen and elaborated metaphors can at least begin to provide the insights necessary to understand one's partners in an interdisciplinary effort. This realization was strengthened by my Illinois colleague, Andrew Ortony. His extensive work on metaphor (1975, 1979, 1993) Is a gold mine for the student who wishes to pursue this line of work. I was also influenced by my truly remarkable graduate students at the time who helped me refine my thinking on metaphors and conceptual change. It was to try to solve the problem of how we learn new conceptual schemes that my work on metaphor emerged.

Of course, the interesting implication for education is that students learning a new discipline are in the same position as the participants were in the interdisciplinary seminars. They all need to learn the theory-laden observational categories of the discipline without the benefit of any a priori neutral set of observations. Students do, however, have a teacher and good teachers are able to use well-chosen metaphors to help bridge the gap between the common sense observational categories of the student and the observational categories to be learned in the discipline. I argue these points in "Metaphorical Models of Mastery: Or, How to Learn to do the Problems at the End of the Chapter of the Physics Textbook" (1976). I believe that Kuhn's (1974) notion of "exemplars" i.e., exemplary problem solutions, is part of what allows the metaphors to be successful. I also suggest here that the scientist involved in conceptual change at the frontiers of the discipline is, in many ways, analogous to the student. Both need to try out new observational categories with the help of metaphors. The student has the teacher to help weed out bad interpretations by guiding the student through the new field with demonstrations, lab exercises, homework, and the like. The scientist has "nature" as teacher. Experiments are performed and they help weed out incorrect predictions, hypotheses, and observational categories. My most detailed account of how metaphors work for both the student learning something new and for the scientist on the frontiers of knowledge can be found in "Metaphor and Learning" (1979a) and in the revision of that book chapter with Rebecca Oshlag (1993).

Naturalized Evolutionary Epistemology

Returning to my first theme at Illinois, I eventually came to see that a naturalized evolutionary epistemology was necessary to encompass all of these insights — the theory-dependency of observation, the growth of knowledge, conceptual change, metaphors, and critiques of behaviorism. And the key slogan for that epistemology provides the title to this chapter, "Blind Variation and Selective Retention." I adopt this phrase from Don Campbell's brilliant piece, "Evolutionary Epistemology" (1974). There is no way that I can fully elucidate this idea in the short space I have available here, nor can I begin to deal with the numerous "standard" objections to a variation and retention view of evolution, whether biological or conceptual. Campbell does a wonderful job, and I devote considerable space to this topic in my book, *The Dilemma of Enquiry and Learning* (1981). For now let me simply say that "blind" does not mean "random." Rather it means that although what is being varied, e.g., concepts, theories, even organisms, does not know beforehand what will be encountered, these variants, because they have survived thus far, already contain a good deal of at least partial wisdom about the environment. We don't start from scratch varying "atoms." Furthermore, selection need not involve the complete elimination of some variants. There are "vicarious" selection mechanisms at work too, e.g., generally accepted common sense theories, other scientific theories not at the moment subject to examination, long-standing common sense observational categories. None of these are a priori infallible, and each may be questioned in its turn, but they at least have worked tolerably well up until now. Finally, although we can never have direct access to "reality as it really is," there is a role for a reality that forms the basis against which we test, change, and test again our representations of it. I am a realist.

My first, short account of how evolutionary epistemology can deal with conceptual change is to be found in "Evolutionary Rationality: Or Can Learning Theory Survive in the Jungle of Conceptual Change?" (1977a). In this paper I argue that given the theory-dependency of observation a philosophical concern for truth cannot be taken simply as some sort of direct correspondence between our observations and conceptual schemes on the one hand and "reality" on the other. Rather, we must consider how our observational categories and conceptual schemes as a whole allow us to deal with the world in terms of all of the human purposes,

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social and individual, that we have. Thus, although I read very little Dewey or James or other pragmatists, I believe that I echo some pragmatic themes in my work. This relation to pragmatism becomes even more evident in "Science and Scientists, Technology and Technologists, and the Rest of Us" (1977b). In this book chapter I explicitly consider the relationship between evolutionary epistemology and pragmatism. Specifically, I argue that evolutionary epistemology can assist pragmatism with several of the traditional challenges to its justification of science. Evolutionary epistemology can help locate sources of values in science while still allowing for the "objectivity" of science and technology that is found in the disciplinary aspects of science. It can, by taking an appropriately long-term and expansive view of the development of science help defend the value of science and technology from isolated counterexamples in which science and technology have not led to humane results. Finally, evolutionary epistemology can help pragmatism deal with the objection that inappropriate social power distributions might capture the social arrangements of the disciplines. This can happen here and there, e.g., in "scientific" objections to global warming funded by industry. But the fact that the scientific disciplines often find other social arrangements to further their work, e.g. universities, "green" organizations, suggests that the discipline will continue to evolve and answer our basic human purposes.

Perceptual Control Theory

Let me turn now to the fourth major theme in my work at Illinois. Just what is "Perceptual Control Theory?" Unfortunately, I can hardly explain it adequately in the brief space available here. I again refer you to the web site mentioned above where you can explore a number of different introductions to the theory, along with on-line demonstrations. The most important insight is that human beings employ negative feed back systems to control their inputs, i.e., their perceptions, rather than their outputs, i.e., their behaviors. Behavior is used to control our perceptions of our environment and these perceptions are compared with what we want to see, i.e., our purposes and intentions in acting. We then vary our outputs, not with any sort of detailed "plan", but almost automatically. These outputs affect the world which in turn affects out perceptions, bringing them closer to what we want to see in the case of well-adjusted control systems. Think of driving a car. We don't calculate which way to turn the wheel when the road turns or a crosswind takes us out of the lane, we just automatically turn the wheel until we perceive the car where we want it to be in conjunction with the road. [1]

My first attempt at introducing Perceptual Control Theory (PCT) to educational audiences was "Action, Perception, and Education" (1974). It fell stillborn from the press. I followed this attempt to present the whole of PCT in one article with a number of more pointed educational implications. In "A Rule by Any Other Name is a Control System" (1976c) I argue that any number of problems with the analysis of rule-following in psychology can be solved by treating rule-following as the operation of control systems rather than as some mysterious and complicated associationist view of habits.

In "Against 'Objective" Tests: A Note on the Epistemology Underlying Current Testing Dogma" (1979) I show how "objective" tests as they are understood in the evaluation literature are sorely limited in how much they can actually tell about the competence and knowledge of those who are being tested. On the other hand, "subjective" tests are much more nuanced and capable of revealing the depth of understanding of the person being tested. All of this follows from a principle of PCT, "the test for the controlled variable." The test for the controlled variable is a method for finding out just what perceptions someone else is actually controlling for with their behavior. The test proceeds by introducing what would be disturbances to the hypothesized variable that one thinks the person is controlling and seeing what they do to counteract those disturbances. Thus, it is no accident that one of the most intellectually challenging tests we have, the Ph.D. oral, allows for the examiners to vary their questions to explore just what the candidate really has in mind. Even doctoral prelims are typically of an essay variety where the candidate can counteract the disturbance introduced by the questions. We certainly do not give Ph.D. candidates "objective" true-false or multiple choice tests.

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1 Those familiar with the educational literature will recognize that William Glasser has written extensively in education utilizing a concept he calls "control theory." Although there are superficial resemblances to Powers' Perceptual Control Theory, Glasser completely fails to appreciate that what is controlled are perceptions, not actions or behaviors. This renders Glasser's version of control theory no more insightful than most cognitivist theories in psychology.

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My most elaborate exposition of how PCT helps us ground testing is to be found in my Philosophy of Education Society Presidential Address, "Testing for Critical Thinking" (1986).

In "Program Evaluation as an Adaptive System,"(1982) I apply the notions of PCT and adaptive systems to argue that in order for program evaluation to be integrated into an institution's structure rather than resisted by it, both the evaluation scheme and the institution must be viewed as adaptive systems which control their perceptions. I also suggest in "Purpose, Context, and Synthesis: Can We Avoid Relativism?' (1995b) that evaluation specialists who insist that evaluation research must be tied to the context and the purposes of the evaluation can, nevertheless, reach warranted conclusions. They do not need to retreat to positivism or be branded as relativists. Indeed, human beings, conceived of as control systems, are able to achieve consistent results in a constantly changing environment. Thus in evaluating how they do that, we must, as evaluators, look at both what the actors are trying to achieve and at how the context in which they are doing this is changing.

The Dilemma of Enquiry and Learning

Clearly the most comprehensive and detailed analysis I give of the various themes encompassed in my philosophical work is to be found in my book, *The Dilemma of Enquiry and Learning* (1981). In this work, I take Plato's Meno dilemma seriously. The dilemma says that we can neither inquire into anything which we know nor into anything which we do not know. For if we already know something, we have no need to inquire, but if we do not know something, we cannot inquire, for we would not know where to begin nor when we had reached knowledge of what we do not know. In short, the Meno dilemma seems to pose the Kantian question, "How are inquiry and learning possible?"

In brief, my solution to the Meno dilemma (after extensive exposition and argument) is that we must step between the horns of the dilemma by giving both of them their due. One of the major preconditions for stepping between the horns is to argue that we must focus on knowledge processes rather than knowledge structures. "Knowing" and "learning" are the fundamental notions rather than "knowledge and "what is learned." If we focus on knowledge process, we can see that even what I called the "old knowledge" horn of the dilemma is really quite sharp. Just because we "know" something in the sense of having acquired a knowledge structure it does not follow that we automatically know how to apply that structure in a constantly changing environment to achieve consistent results. Recall the example of driving a car. Almost everyone already "knows" how to drive. Yet each time we are on the road, even on our well-worn route to the office or the grocery store, we are faced with different circumstances with which we must cope in order to get where we are going. The behaviorist and even traditional cognitivist psychological approaches to explaining our continuing successes in such situations face insurmountable difficulties.

In the book I call the knowledge process that accounts for our ability to utilize existing conceptual frameworks in changing circumstances, "assimilation," and while the term is similar to Piaget's use of the same language, I do not give it a Piagetian elaboration. Rather, I present Perceptual Control Theory and show how it transparently shows how conceptual structures conceived as perceptual control systems and hierarchies of control systems explain our ability to achieve consistent results in very different environments.

Of course, the "new knowledge" horn of the dilemma is very sharp as well. Occasionally, we really do need to radically change our conceptual schemes, whether we be a scientist on the frontiers of knowledge or a student just learning a brand new discipline that is incompatible with the student's existing beliefs. I call the knowledge process that accounts for radical conceptual change, "accommodation," although again the concept is not the Piagetian one. I argue that the blind variation and selective retention mechanism elaborated in a naturalized evolutionary epistemology is what is needed to account for successful processes leading to new knowledge structures.

The way between the horns of the dilemma lies in recognizing a reflective equilibrium between assimilation and accommodation. In dealing with the world we almost always try to assimilate new situations by means of our existing knowledge processes. However, if we continuously fail to be successful, we may need to try new structures. These new trials are best understood as metaphors that have to be tested against the world through whatever observational categories we happen to be using. Gradually, both metaphors and observations are brought into a kind of equilibrium, at least for the moment.

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Educationally, I argue that we seem not to recognize the need for both assimilation and accommodation. Still less are we aware of when one ought to be stressed and when the other. In any educational situation we need to carefully analyze whether we are trying to get a student to refine an existing knowledge process and when we are trying to get the student to acquire new knowledge processes. We must always be striving for a reflective equilibrium between assimilation and accommodation in both our classroom practice and our educational policy making.

The book brings together in one place almost all of my thinking about educational epistemology. It utilizes themes from conceptual change, the centrality of metaphor, a focus on knowledge processes, the new psychology of Perceptual Control Theory, and a naturalized evolutionary epistemology.

Transitions

During the year's in which I was writing *Dilemma*, I was also undertaking a number of new blind variations in both my personal and professional lives. I divorced and remarried. I have now been married for 28 years to my wife, Carol Hodges. During this period, some of my writing on accountability and evaluation as well as my work in interdisciplinarity apparently came to the attention of the higher administration at Illinois. I was asked to take over as the director of the campus-wide program evaluation system at the university. Since it was just about my turn to assume a term as chair of my department, I blindly decided that the university-wide administrative position would be more interesting and probably less challenging than departmental politics. I was certainly wrong about the latter assumption. However, the opportunity to utilize my expertise in interdisciplinary inquiry to assist a blue ribbon campus committee of professors from different disciplines pass evaluative judgments on their colleagues' departments was one of the high points of my administrative career. And all of this was going on while I was writing my book!

The next blind variation came with our decision to move to Buffalo. Since Carol was a Ph.D. graduate of the University of Illinois, she was only able to teach there for several years on soft money and we were constantly on the lookout for a place where we could both obtain academic positions. By 1981 I had completed my stint as a campus-level administrator, but there were almost no openings for a philosopher of education, at least at institutions that also were looking for a reading and elementary education professor. So I started looking for administrative positions and in 1981 Carol accepted a faculty position at State University College at Buffalo and I accepted the deanship of the school of education at the State University of New York at Buffalo—both SUNY institutions, but separate.

A Philosopher Dean

This began my 16 year tour of duty as dean, followed by two years back as a professor before retirement. During my tenure as a dean, my professional focus turned largely to educational policy issues, although still strongly influenced by my philosophical beliefs. There were several strands to this focus. In 1987 a number of colleagues and I founded the journal, *Educational Policy.* A number of the "themed" issues from the journal were fleshed out and became edited books (Weis, L. et al. *Crisis in Teaching: Perspectives on Current Reforms*. 1989a), (Weis, L. et al. *Dropouts from School: Issues, Dilemmas and Solutions*. 1989b), (Altbach, P.G. et al. *Textbooks in American Society: Politics, Policy, and Pedagogy*. 1991a), (*Weis, L. et al. Critical Perspectives on Early Childhood Education*. 1991b), (Petrie, H.G. *Professionalization, Partnership, and Power*. 1995). A second focus emerged from my role as one of the founders of the institutional educational reform movement known as the Holmes Group (see the Holmes trilogy, *Tomorrow's Teachers* (1986), *Tomorrow's Schools* (1990), and *Tomorrow's Schools of Education* (1995). Although the Holmes Group as an organization is no more, the ideas it propounded have had a significant impact on teacher education. Extended preparation programs, a strong liberal arts education, a rejuvenation and strengthening of professional training, the concept of professional development schools as a joint project of real schools and schools of education, an emphasis on more practice-oriented research by education professors in research universities—all are now part of the educational landscape in one form or another.

I wrote on extended preparation and the liberal arts in teacher education (1987a, 1987b), strengthening professional preparation (1990), and professional development schools (1995a). I also continued to utilize my interests in educational epistemology in

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my policy writings. In "Knowledge, Practice, and Judgment," (1992b) I argued that we must substitute a notion of teacher judgment for that of "applying" research to practice. The latter depends for its justification on discredited views of knowledge processes, while the former takes full account of the view of knowledge processes I describe in *Dilemma*. Finally, in "From 'My Work' to 'Our Work'," (1998) I reflected on my experiences as a dean in trying to encourage changes to the faculty culture in schools of education in research universities. Instead of the faculty viewing themselves as more or less independent intellectuals who happen to have a mailing address and Emil account at a university, I tried over my years as a dean to encourage more collaborative teaching, research and outreach activities with the rest of the education profession—a shift from "my work" to "our work." At best, I had modest success.

Conclusion

Nevertheless, as I suggested in my valedictory address to the last group of students who graduated under my deanship, our efforts in the academy, whether teaching, research, service, or administration, are all a work in progress. As an education profession we refine our knowledge here and there and occasionally, blindly stumble across something quite new. Once in awhile, those blind variations are selectively retained and our profession lurches forward. The best each of us can do is make our own individual contributions and hope that some will "stick." That is what I have tried to do since my first encounter with that dean of admissions from California Institute of Technology over 50 years ago. I have undertaken one blind variation after another, starting with "broadening" my undergraduate education to include business as well as engineering. As it turns out my undergraduate business degree stood me in good stead as a dean 30 years later. I stumbled onto Don Campbell and Bill Powers and they changed my intellectual life in the most profound ways. I participated in an interdisciplinary seminar and became fascinated with the topic. I became a campus level administrator to avoid being a chair and was then able to find employment as a dean so that my wife and I could pursue joint careers in education. As a dean I put my philosophical background to work in furthering the cause of educational reform. I varied a lot of things, the outcomes of which I certainly could not have predicted in advance. But I used my knowledge and experience and values to select and retain what I hope were the best of those variants. I can only hope that others will carry on the work in progress that is educational philosophy.

Hugh Petrie's Favorite Works

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