McLaren's comments that the book makes mentorship into a "revolutionary action" that "is instructive, emancipatory, and theoretical" (back cover). Notwithstanding such hyperbole, this is an interesting and informative book that is recommended reading for all educators who see mentoring as part of their role. And, if the hopes of the authors are realized, then that would include all educators. The group whose narratives are recorded here might not live happily ever after, but we should be pleased that they came together and shared their stories with us. Through this we are invited to join the larger circle and meet the challenge "to improve mentoring conditions for the professional development of educators and students" (p. xxiii). A worthy goal indeed.

J. Tim Goddard
Faculty of Education
University of Calgary
Calgary, Alberta, CANADA

Kilbourn, B. (1998). *For the love of teaching.* London, ON: The Althouse Press, 207 pp.

This book on the nature of teaching is a radical departure from the how-to type of treatise one is accustomed to encountering. Here, the reader is faced immediately with the complexity of the issue and invited to approach it both as a problem for abstract analysis and from the perspective of people actually engaged in the task. The book begins with an essay about Dr. Kilbourn's personal experience in helping his ten-year-old daughter with a homework assignment in science. It traces the twists and turns of the process as it occurs over several days and then attempts an after-the-fact analysis of what had actually happened (and failed to happen) in terms of the presumed initial objectives of the exercise and from the perspectives of both parent and child. The second section comprises a novella featuring two young teachers. Because one (a female) has had considerable successful classroom teaching experience and the other (a male) is relatively new to

the job, they are thrust into a helper-learner professional relationship involving mutual analysis and synthesis of the entire teaching enterprise: a relationship which then quickly extends into other aspects of their lives.

Early in the introduction we read that the novella is "premised on the assumption that there is room to say serious things about teaching in a form that is not saturated with jargon and that is open to a more general audience," the overall objective of the two sections of the book being to "convey complex ideas in an approachable fashion"(xiii). This is indeed an admirable aim and any book that succeeds even partially in achieving it is well worth reading and referring to in the course of one's work.

In many ways *The Love of Teaching* lives up to its promise. I particularly appreciated the author's recognition of the way in which the encroaching "culture of violence" is drastically altering all classroom relationships and, inevitably, the substance and process of learning. I liked the well-justified complaint that "as with poets, researchers talk to each other – conference after conference, paper after paper, flowing through the mainstream of our subculture, unlikely to dampen a general public's enthusiasm for *watching* and its fantasy of easy solutions to complex problems" (p. 62). I enjoyed one character's insightful comments about her son's teacher (an all-too-common type). "In the name of letting them work on their own," she told her friend, "he wouldn't take the time to point out any of the principles that the exercises were meant to demonstrate" with the result that the child came to believe that science is "anything you want it to be" (p. 103).

In this "show-biz" dominated world, it becomes doubly necessary for people in roles such as that of Kilbourn to remind us that the teacher's responsibility is to stimulate – not to entertain! Also that the academic educational enterprise continues to be crippled by jargon, with empowerment and celebration merely serving as the latest in a long succession of "in-words." I particularly appreciated the following reference to the experience of two busy teachers at the advent of a new principal who had arrived resplendently astride the latest band wagon: "So we were 'encouraged' to attend workshops on collaboration. My work with Jill came to a sliding halt"(p. 180). And my heart warmed at the mention of my old favourite,

Josephine Tey's "Daughter of Time," as an example of how even the most reluctant learners can be led to know and love history (p. 129).

However, although there is much to admire in Kilbourn's effort to shed disciplined light on the enterprise of teaching, I found worrisome deficiencies and misinterpretations as well. What struck me most forcibly was the almost total absence of expressed awareness of how children learn and of how this varies for learners at different stages of development. It was as if he were attempting an interdisciplinary approach while overlooking one of the most critical of the disciplines involved! So many of the situations being described and analyzed in both the essay and the novella would have benefitted from the inclusion of this vital component of teaching. Granted there seems, at times, to be an implicit awareness of its existence, but it is never made explicit. The closest Laura (the senior teacher in the novella) comes to doing this is when she tells Paul "the moves I make cannot be preplanned .... [They are] shaped by underlying understandings about science, epistemology, maps, teaching, and *kids*" [italics added] (p. 142).

Laura appeared to be inadvertently applying a major principle of learning when she regularly emphasized the role of reinforcement in the analysis of the transcript of her class discussion. For example: "I wanted to *reinforce* the idea that supporting claims with evidence was what the exercise was all about"... "but I wanted to *reinforce* the concept of qualifiers ... (p. 153); "one of the ways I encourage conversation is by *reinforcing* the idea that they should pay attention to what each other is saying" (p. 154); "that's a good move because it *reinforces* that interpretations depend on the data we observe" (p. 155); "I wanted them to understand the structure of arguments in science – and in everyday life ... I see I missed a lot of opportunities to *reinforce* that second goal. Things got too loose" (p. 164); 'I could have *reinforced* the concepts by self-consciously using the terminology and asking them to use it" (p. 165) [italics added].

How much more fruitful all this might have been, however, if there had been a discussion of how reinforcement relates to learning and of just what would constitute appropriate reinforcement for learners at the general developmental level of Laura's class, at each juncture in the process.

A more serious problem has to do with both the *medium* the author chose for his presentation and the more fundamental *message* being communicated by it; as well as the level of abstraction in which that message is delivered. To begin with the medium, the fact that the book is divided into two parts differing in form and genre has inevitable consequences for the clarity and integration of the message. It seems to me to insert a fragmenting effect on the book as a whole. But, most important, of course, is the message and the author's success in communicating it clearly. In any work dealing with epistemology, the world view of the author shapes and colours substantive issues, and it is on this world view that I will now focus.

What does *The Love of Teaching* tell us concerning the author's ultimate assumptions about the nature of reality – particularly about what it is possible for humans to know and how they can come to know it? It is these assumptions that inform his approach throughout, both to the process of teaching and the content and principles to be learned. What this means, for me, is that the most important question to ask at the outset is "Do the epistemological assumptions in which this book is rooted contribute to, or detract from, a clearer understanding of the process of teaching – in particular, the teaching of science?

How can we go about identifying these assumptions and assessing their adequacy and workability in practice? Early on, Kilbourn makes a revealing comment when describing his work with his daughter: "I thought that it was important that Alison begin to understand that the essence of science was *one* way of explaining natural phenomena, [italics added] and that frequently the process involved predicting what might happen under certain circumstances"(p. 22). This immediately alerts the reader to the fact that (a) he may consider other ways of interpreting empirical data to be equally reliable and valid to that of science, and (b) he does not seem to recognize prediction as *the distinguishing feature* of science. Kilbourn then recounts

in considerable detail how he felt it necessary to add the categories of "explanation" and "prediction" to the standard four steps in scientific methodology (purpose, method, observation, and conclusion).

But was this added complexity, in fact, necessary? Indeed it could be argued that this was a good example of how one's epistemological assumptions can throw up unnecessary roadblocks in teaching. What was done at this point would seem to have been needlessly confusing for the learner. The stage labeled "purpose" in the process of doing science is normally understood as the place to help the student frame and formulate a testable hypothesis. Such hypotheses are, by their very nature, *predictions*. They reflect the "if-then," or conjectural nature of scientific claims as opposed to other attempts to locate what Kilbourn would call the truth of an experience. How else would one formulate one's purpose in performing an experiment or doing research, without departing from the essential method of science? The same kind of situation applies where explanation is concerned. The conclusion is necessarily expressed not only as a logical inference from what has been observed in the process of testing the hypothesis but also in the form of an explanation of all this in terms of the original theory or hypothesis.

Many examples from the child's own experience could have been used here. The PURPOSE becomes "We will try this and observe to see if what happens is what we expect to happen, *given* what we already know about how these things work. In other words, *if* we do this, *then* this consequence should follow." A focus on METHOD ensures a concise description of what was actually done and then, following an equally exact documentation of subsequent OBSERVATIONS, the CONCLUSION either takes the form of "this happened as we predicted because ..." or (even more important in science) "this did not work out as expected. Because our guess did not hold up in practice we must look again at our method as well as at our prediction and the explanation (or theory) from which it derived." If one's objective is to identify the most basic concepts of science, and to teach these in a language appropriate to the cognitive level of a ten-year-old, it would seem that the old four-stage process (properly understood) has the advantage of both adequacy and simplicity.

Later in the essay, we do find the father telling his child that "scientists usually try to explain things that can be put to some kind of reasonable test" (p. 34) – but after so much obfuscation this crucial aspect of the lesson may very well have gone unnoticed. And, to give him the credit due, Kilbourn does express regret over his failure to make explicit the chief points Alison had learned about the difference between observation and inference (p. 30). I wish he had recognized another missed opportunity: the chance to teach his daughter the simple meaning of purpose and conclusion in scientific method and thus what it is that makes science uniquely powerful as a way of understanding natural events.

So much for the author's epistemological assumptions as revealed in the first section of the book, "Teaching Alison Science." Another important hint concerning these comes early in the novella, "To Seek a Deeper Truth." "Meaning is different in science and ethics," Laura tells Paul. "They have different epistemological foundations. But although they are distinct realms of meaning, they converge in the kinds of dilemmas we face in technology and the environment" (p. 101). This "realms of meaning" reference is made explicit when Laura draws on the work of the 1940s writer, Stephen Pepper. He recognized four *equally legitimate* approaches to truth, calling them "formism," "mechanism," "contextualism," and "organicism." Two additional approaches – "animism" and "mysticism" – he considered to be relatively inadequate as means of interpreting experience, because they lack a concept of evidence. Laura cites four root metaphors which, she maintains, correspond to the four "relatively adequate" sources of meaning: "similarity" for formism; "machine" for mechanism; "situation" for contextualism; and "integration" for organicism. Once students acquire these metaphors, she suggests, they are at least partially equipped to "seek a deeper truth."

The other requirement for that search would appear to be an understanding of the rules of logic and evidence, specifically as outlined in Stephen Toulmin's method of argument presentation, written in the late 1950s. As Laura explains it to her students, evidence for a position taken in an argument includes the data supporting it as well as what Toulmin called the "warrants"and

the "backing" for the data. Another of Toulmin's ideas is that every conclusion should contain a "qualifier" which indicates the degree of certainty concerning a conclusion and how generalizable it is likely to be.

I suspect that many readers will experience some discomfort with the adequacy of the epistemological position derived from these two sources. Taken together, I felt that not only do they represent a fragmented and unnecessarily complicated view of science for introduction to students in elementary and secondary school, but that they open the door to the quagmire of relativism in which we find today's postmodernists. Evidence that Laura may have at least partly succumbed to this danger is found in a number of her comments. For example, she appears to be confusing the personal proclivities of individual scientists with the universally accepted method of scientific inquiry when she says, "But there are so many ways in which scientists are not objective" (p. 123). She asks, "What is a fact?" but, rather than answering the question, tells Paul that "Experiential, academic and poetic truths are all helpful in different ways for understanding the nature of a situation" (p. 184). She does an acceptable job of explaining poetic truths but fails to note whether we should regard these as facts on a par with the knowledge constructed within science. And as to the source and justification of academic truths we are left utterly in the dark!

In response to Paul's query, "Truth is relative, isn't it?" Laura says, "I want kids to think about the possibility that truth is relative, but not totally relative" (p. 108). Elsewhere she expresses the desire to teach her science students to *understand* but not to *believe*. Does she mean that she doesn't want her students to believe *anything*? Or does she mean that it's alright to *believe* the claims of creationism as long as one *understands* evolution? Actually, her aim appears to make sense only if she is defining belief as blind faith. How much less confusing for her students if she had sought to teach them the difference between *scientific beliefs* which are held tentatively subject to disconfirming evidence, and those derived from intuition and revelation. All this leaves the reader doubtful that students could emerge from the classes of either Laura or Paul with a firm grasp of the major scientific criteria for judging the relative objectivity,

reliability, and validity of the various truth claims abounding in modern culture.

In explaining the method of science to her friend and fellow teacher, Laura mentions both the older Realist correspondence theory of truth and the Idealist coherence theory. However, (and most tellingly) she omits the Pragmatic test which focuses on the modern empirical question of "Does it *work* to predict consequences?" A casual reference to Pragmatism in a subsequent discussion reveals some serious confusions concerning that theory of knowledge. "The pragmatists thought that truth was relative and was really a matter of usefulness in explanation" (p. 190). The first part of this sentence is dead wrong and the second reveals a common misunderstanding of the fact that, for the *philosophical* Pragmatist (as distinct from the everyday sense of the term), usefulness refers specifically to success in predicting the consequences of action. She then goes on to explain that, according to Pragmatism, "the quest for certainty was an illusion." No problem here. They were simply pointing out that we fallible humans are deluding ourselves when we claim knowledge of absolute truth. But Laura then goes on to say, "*We* could be an illusion." This in no way follows from the reminder that absolute knowledge is beyond our grasp. In fact, it is the precise opposite of what Pragmatism teaches. Unlike Descartes, the Pragmatists would say *we act* and because those actions have observable *consequences* for the world around us; they provide compelling evidence that we exist within the evolving stream of nature.

None of this, however, means that knowledge is relative. Modern Pragmatism teaches that reliable knowledge is what *works to provide humans with the power to control consequences.* Facts reflect cause-and-effect regularities that can be predicted on the basis of the system of universally applicable and compellingly tested explanations (theories) built up by the relevant scientific community. Laura appeared to be uncomfortable with the notion, introduced by Paul, that science implies control. But of course a grasp of scientific facts confers the power to control future events. This represents both the danger and promise of science and the technologies made possible by it. It explains precisely why we need, now more than ever before, an understanding of the scientific enterprise that focuses

on *consequences*. And we need to understand the role of universally applicable values in determining which, of all the rapidly multiplying consequences now being made possible by science, are morally acceptable in a universal sense and which are not.

In the only reference to the ethical dilemmas introduced by the power of science, the author appears to be equating the ethical with religious. Paul responds by asking if *bringing religion in* isn't "a bit risky" and Laura switches course confusingly by saying, "I'm thinking only about the religious significance of light as opposed to the scientific significance of how light works" (p. 102). I found this statement to be utterly confounding in terms of what had preceded it; and unless the speaker was referring to the *historical* significance of light in terms of the beliefs of various religions in various eras of history. In that case, there should have been a recognition of the importance of the historical method of inquiry: of its necessary role in the scientific process as well as the ways in which, as an independent pursuit, history differs from science. In fact, I found myself frustrated throughout the book by the utter absence of any discussion of historical method – even when the subject involved the epistemological assumptions most relevant to it (such as Stephen Toulmin's work on the nature of logical argument and the warrantability of knowledge claims regarding particular events). Recent books by the American philosopher of science, Susan Haack, would have been an invaluable source here.

To sum up, I would suggest that Laura would have done better in making modern science understandable for her classes if she had relied more on Popper and less on Pepper; and if she had read more of Peirce and Dewey along with recent interpreters of scientific reasoning such as Haack – and less of Toulmin.

Pat Duffy Hutcheon
Vancouver, British Columbia
CANADA