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The concept of pedagogic content knowledge is by now a familiar one: Lee Shulman introduced it into the lexicon of research on teaching in order to pick out a distinctive, subject-centered feature of the knowledge base of teaching. But is teachers' knowledge of subject matter different in kind from that of scholars? This article investigates that question. First, it rejects a possible answer derived from objectivist epistemology on the grounds of its untenability. Second, it explores Dewey's account of subject matter knowledge to determine if his position justifies a division in subject matter between scholarly and pedagogic forms. The article concludes by rejecting Shulman's dualistic theory and affirming an alternative: that all knowledge is, in varying ways, pedagogic. This result points to a community of teaching and scholarship that is at odds with our institutional arrangements and practices.

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T here is today a widespread conviction that good teachers know things that others do not. As teaching has moved to a more central role in educational reform, the search for this special knowledge base has become an increasingly important enterprise for educational researchers and policy-makers. In addition, the longstanding stereotype of the dual nature of teacher knowledge—as knowledge of subject matter, on the one hand, and knowledge of teaching methods, on the other—has been criticized from a number of quarters. Most of the attention has been paid to the pedagogical side of teacher knowledge. Good teachers, we are learning, know a good deal more than simply how in some narrow sense to teach a lesson. They also know how to organize classrooms for instruction, maintain an appropriate classroom and school climate, think through the problems of teaching in advance and in action, understand the sociocultural differences among their students, and so on.

Lee Shulman has drawn attention to the other major dimension of the stereotyped view of teacher knowledge.[1] It is, according to him, no longer reasonable to suppose that teacher knowledge of subject matter is identical with ordinary scholarly knowledge. The common sense belief that good scholars are not necessarily good teachers and the research finding that there is apparently little relationship between teachers' scores on standardized subject matter tests and ratings of their instructional effectiveness suggest not only that teachers know about children, classrooms, schools, and teaching processes but also that they know something special about the subjects that they teach.[2] Shulman calls this special subject matter knowledge *pedagogic content knowledge*, which he defines as "the particular form of content knowledge that embodies the aspects of content most germane to its teachability."[3] Shulman conceives of pedagogic content knowledge as both a separate category of teacher expertise and as a bridge between the categories of subject matter and pedagogy included in the standard view of teacher knowledge.

In this article, we will be concerned, as Shulman is, with the relationship between teaching and scholarly knowledge of subject matter. We are sympathetic with Shulman's aim to reintroduce the important matter of teachers' knowledge of the subjects that they teach into contemporary think-

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[1] We refer here to Shulman's discussion of the knowledge bases of teaching in Lee S. Shulman, "Those Who Understand; Knowledge Growth in Teaching," *Educational Researcher* 15, No. 2 (1986):4–14; L.S. Shulman, "Paradigms and Research Programs for the Study of Teaching," in *Handbook of Research on Teaching*, ed. M.C. Wittrock (New York: Macmillan, 1986), 3–36; and L.S. Shulman, "Knowledge and Teaching: Foundations of the New Reform," *Harvard Educational Review* 57, No. 1 (1987): 1–22.

[2] Suzanne M. Wilson, Lee S. Shulman, and Anna E. Richert, " '150 Different Ways' of Knowing: Representations of Knowledge in Teaching," in *Exploring Teachers' Thinking*, ed. J. Calderhead (Sussex, England: Holt, Rinehart, and Winston, 1987), 106–107.

[3] Shulman, "Those Who Understand," 9.

ing and research on teaching. We also believe that studies on the growth of teacher knowledge and thinking that Shulman and his colleagues are engaged in can make significant contributions to the understanding of teaching, and eventually to its improvement. We are concerned, however, that his distinction between content knowledge and pedagogic content knowledge introduces an unnecessary and untenable complication into the conceptual framework on which the research is based, a complication, moreover, that could lead to research questions—such as, "How do novice teachers make the transition from one form of content knowledge to the other?"—that we believe are misconceived.

We will argue here, on epistemological grounds, that Shulman's distinction cannot be supported because all content knowledge, whether held by scholars or teachers, has a pedagogical dimension. Shulman is never very explicit about what theory of knowledge he is basing his distinction on. The language he uses to describe the distinction strongly suggests that he holds an objectivist view of content knowledge, one in which such knowledge is grounded in objective reality. Yet he also hints that his views are consistent with those of John Dewey, which are decidedly not objectivist.[4] Therefore, we will consider the distinction from both perspectives.

In the following section, we will review the contemporary critique of objectivism to show why that view of knowledge cannot be relied upon to support Shulman's distinction. Next, we will closely study Dewey's account of subject matter knowledge to determine if the distinction can find theoretical support there. Our aim is twofold. First, we wish to show that the distinction between content knowledge and pedagogic content knowledge cannot depend for its theoretical support on objectivism, because that doctrine is untenable; nor can the distinction depend on Dewey, because his work aims at resolving such dualisms. Second, we will show that contemporary epistemology and Dewey's work imply that there is an alternative to the division of subject matter knowledge into scholarly and pedagogic forms—namely, that all subject matter knowledge is pedagogic. This thesis, we believe, provides even stronger support for Shulman's interest in and study of teachers' knowledge of subject matter than his own dualistic account. Finally, we will reflect upon some of the consequences of our arguments and particularly on the significance of the conceptual unity of scholarship and pedagogy.

Objectivism and Shulman's Distinction: Content Knowledge Per Se and Pedagogic Content Knowledge

As we begin to examine Shulman's distinction, we need to be clear about precisely what differences in the knowledge of scholars and teachers he supposes there to be. In his initial paper on the subject, Shulman defines

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[4]Wilson et al., " '150 Ways of Knowing'," 106.

the knowledge of the scholar, what he refers to as *content knowledge*, as "knowledge per se."[5] Following Joseph Schwab,[6] Shulman declares that this knowledge encompasses not only the recognized facts of the field but also the logical relations among facts, concepts, and principles, and the standards of judgment of the field. In addition to content knowledge, teachers possess *pedagogic content knowledge*, which is defined as going "beyond knowledge of subject matter *per se* to the dimension of subject matter knowledge *for teaching* . . . ways of representing and formulating the subject that make it comprehensible to others" (emphasis in original).[7] Thus, pedagogic content knowledge includes a command of these alternative representations. Shulman also suggests that teachers have special skills in selecting and adapting alternative representations of subject matter to meet the needs of learners, skills that scholars presumably lack.[8] Thus, pedagogic content knowledge includes a command of a particular content (alternative representations) and a particular process (pedagogical reasoning).

We wish to consider whether it is reasonable to distinguish content from pedagogic content knowledge in the way that Shulamn proposes. He maintains that teachers have at their disposal a wide variety of ways of representing subject matter: a phrase that he and his coauthors use is "150 ways of knowing."[9] These pedagogic representations are alternatives to the scholar's representation of the subject matter. Teachers need to be concerned about whether their representations of subject matter are teachable to others; scholars, by implication, do not. Why should scholars' representations be privileged in comparison with teachers' representations? And why should the teachability of representations be of no concern to scholars? Shulman never directly answers these questions, but one natural answer immediately suggests itself: because scholars' representations are an accurate reflection of the world as it really is; they are objectively true.

We cannot with certainty ascribe an objectivist theory of scholarly knowledge to Shulman although his references to "subject matter *per se*," and his references to a form of content knowledge that is distinguishable by appeal to its concern with the teachability of its representations, strongly suggest that he harbors such a view.

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[5]Shulman, "Those Who Understand," 9.

[6]We refer here, as Shulman does, to Schwab's distinction between knowledge of substantive and syntactic structures. See J.J. Schwab, "Education and the Structure of the Disciplines," in *Science, Curriculum, and Liberal Education,* eds. I. Westbury and N.J. Wilkof (Chicago: University of Chicago Press, 1978), 229–272.

[7]Shulman, "Those Who Understand," 9.

[8]Shulman, "Knowledge and Teaching," 16.

[9]This phrase is taken from a teacher, the subject of their study, who is quoted to the effect that "When you learn [biology] to teach, you have to be able to handle . . . 150 different approaches to it because you have to be able to handle every different student's approach." In Wilson et al., " '150 Different Ways'," 104.

Objectivism would provide a clear justification for Shulman's distinction —scholars' representations are privileged because they are closer to the truth than teachers' efforts, which are further removed because they are representations of representations. Scholars, then, need not be concerned with the teachability of their ideas because objectivity, and not teachability, is the criterion to which they must appeal. The task of the scholar is to represent the truth; that of the teacher is to make that privileged representation accessible to ordinary mortals by translating it into familiar words and images. Scholarly knowledge represents the world; pedagogic content knowledge represents the scholar's representation to the rest of us.

To be sure, Shulman does not espouse objectivism or any other systematic epistemological theory as the ground for his distinction. But because of the natural support that objectivism lends to the distinction, the objectivist flavor of Shulman's language, and the traditional attractiveness of objectivism, it is important to review the contemporary philosophical assessment of this theory and show why it no longer provides dependable grounds for his distinction.

Richard Rorty has recently reminded us that an objectivist view of scholarly knowledge is hardly novel.[10] It is, in fact, the ideal of human knowledge that has informed the Western philosophical and scientific tradition since Plato. It also has been under serious attack for over 150 years, beginning with Hegel's effort to place human understanding in historical context. We cannot here rehearse the entire history of this ideal and the difficulties it has been found to present, but we will briefly consider several recent and important challenges to it.

Since around 1700, the form that this ideal has taken in Anglo-American thought is empiricism, the doctrine that human experience can provide the ultimate test of our claims to represent reality accurately. We focus on empiricism because of its influence not only on the philosophy of science but also on thinking about educational research and pedagogy during the twentieth century. According to empiricism, the scholar's task has three distinct dimensions: (1) to discover a language whose concepts accurately reflect the basic units of reality; (2) to propose principles for organizing that language, or theories, that attempt to reflect the actual relationship among those basic units of reality; and (3) to test those theories against our experience of reality.

The first task obviously depends upon the tenability of what has been called the picture theory of language, the idea that language can and does

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[10]Both Richard Rorty and Richard Bernstein have written influential critical discussions on the subject of objectivism, understood as the aim of traditional epistemology to ground our knowledge claims on certainty. See Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton, NJ: Princetown University Press, 1979), and Richard J. Bernstein, *Beyond Objectivism and Relativism: Science, Hermeneutics, and Praxis* (Philadelphia: University of Pennsylvania Press, 1983).

paint a picture of reality. Although Ludwig Wittgenstein initially articulated this view of language in his *Tractatus Logico-Philosophicus*,[11] he later showed us that language functions in human life in far more complex and interesting ways.[12] In his *Philosophical Investigations*,[13] Wittgenstein noted that, even in its simplest forms, language arises in the context of human activity and therefore takes on whatever purposes its developers and users are actually pursuing in the context of its use. Thus the nature of language is not fundamentally representational as the picture theory of language supposes. Indeed, language has as many purposes as its users choose to give it. If language is not fundamentally representational, then it is impossible to discover a language stripped of all human intentions and purposes, and it is impossible to discover a criterion of truth as correspondence between representations and the things they represent. The first step in the empiricist program to construct a system of beliefs that meets the traditional Western ideal of knowledge cannot, therefore, be accomplished.

A similar result follows from the work of Willard Van Orman Quine. Quine reminds us that the empiricist program crucially depends upon a clear distinction between analytic and synthetic statements.[14] The truth or falsity of analytic statements depends entirely on the meanings of their terms; definitions, logical claims, and tautologies are thought to fall into this category. The first step of the empiricist program depends upon the existence of analytic truths because it is in analytic statements that we must identify the meanings of and interrelationships among the reality-reflecting concepts that form the foundation for empiricist inquiry. The truth or falsity of synthetic statements, on the other hand, does not depend solely on the meaning of the terms but also upon our experience of the world. The theories proposed in the second step of the empiricist program must consist of such synthetic statements, statements that make claims about the experience that people have had or will have. In this way, we will, as the third step requires, be able conclusively to test those theories by comparing their claims with our actual experience.

Quine was able to show that statements simply do not fall neatly into these two categories of analytic and synthetic.[15] And, in so doing, he of-

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[11]Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. D. Pears and B. McGuinness (London: Routledge and Kegan Paul, 1961).

[12]See also J.L. Austin, *How to Do Things with Words* (Cambridge, Mass.: Harvard University Press, 1962).

[13]Ludwig Wittgenstein, *Philosophical Investigations*, 3rd edition, trans. G.E.M. Anscombe (New York: Macmillan, 1958).

[14]Quine refers to the analytic/synthetic distinction as one of the "dogmas of empiricism." See Willard Van Orman Quine, "Two Dogmas of Empiricism," in *From a Logical Point of View*, 2nd edition (New York: Harper and Row, 1961), 20–46.

[15]Ibid., 36.

fers a view of language and belief that is at odds with the hierarchical and foundational model implicit in empiricism. In the empiricist view, our beliefs about the world rest upon a foundation of conceptual and logical claims that are necessarily true. Quine suggests by contrast that our linguistic, logical, and empirical beliefs form a web in which some of those beliefs lie closer to the periphery of experience than others.[16] When we have experiences that conflict with this system or web of belief, we tend to revise those peripheral beliefs first. Sometimes, however, in the face of contradictory experience, we revise beliefs toward the center of the web, changing our concepts and even our principles of logic. Without a foundation in unrevisable analytic truths, the empiricist search for a single, objective representation of the world must fail. Indeed, Quine later argues that independent, alternative systems of belief are possible that are also consistent with human experience.[17] If Quine is right, the idea that scholarly representations of the world have a privileged status because they stand in a special and unique relationship with reality is untenable.[18]

Finally, recent philosophers of science have shown that the work of our best scientists does not and cannot follow the empiricist program. Empiricism requires that scientists must revise or reject their theories when they encounter anomalies, instances when the predictions of those theories are not borne out in experience. The history of science is littered with examples in which our most revered scientists —Galileo, Newton, Priestley, Einstein—refused to abandon their theories in the face of apparently refuting evidence.[19] Often these scientists failed to appreciate the importance or even the existence of anomalies. Thomas Kuhn and N. R. Hanson have argued that these failures stem from the fact that perception is theory-laden.[20] Theories, according to Kuhn and Hanson, not only generate formal predictions about our experience but also act to organize, focus, and interpret that experience by providing conceptual categories for and creating expectations about our perceptions of and interactions with the world. As a result, scientists sometimes quite literally do not perceive the evidence that their theories are inadequate. If Kuhn and Hanson are right, the em-

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[16]Quine introduces this idea in "Two Dogmas of Empiricism," 42, where he compares science to "a field of force whose boundary conditions are experience." He later adopts the metaphor of the web in, for example, W.V. Quine and J.S. Ullian, *The Web of Belief,* 2nd. edition (New York: Random House, 1978).

[17]Willar Van Orman Quine, "Ontological Relativity," in *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969), 26–68,

[18]Rorty, *The Mirror of Nature,* 192–209.

[19]Larry Laudan, *Progress and Its Problems: Towards a Theory of Scientific Growth* (Berkeley, California: University of California Press, 1977).

[20]Thomas S. Kuhn, *The Structure of Scientific Revolutions,* 2nd edition (Chicago: University of Chicago Press, 1970); and N.R. Hanson, *Patterns of Discovery: An Inquiry into the Conceptual Foundations of Science* (Cambridge: Cambridge University Press, 1958).

piricist assumption that experience provides an independent test of our theoretical representations of the world is called into question.

Even when scientists understand that a particular phenomenon is inconsistent with a theory, they still rarely abandon that theory. Most often they simply ignore the apparently refuting evidence, especially if no other available theory can explain it.[21] At other times, scientists will make ad hoc adjustments in beliefs that are not central to the theory (such as beliefs about how their instruments function) in order to render the evidence consistent with the theory.[22] These reactions to anomaly suggest that scientists take a far more pragmatic attitude toward theory work than the empiricist program allows for. Empiricism, in line with the Western tradition, proposes that the aim of scholarly inquiry is the discovery of truth. If this were so, scientists ought to take evidence of the falsity of their theories with the utmost seriousness. Since they do not, it is, as Larry Laudan has argued,[23] likely that scientists are more concerned with the practical task of solving problems than with the issue of whether the tools they use for that purpose are faithful representations of ultimate reality. Indeed, Laudan finds little historical evidence that scientists themselves accept just one such detailed representation as privileged.[24]

Combined, these arguments are devastating to the empiricist program. They also make it more difficult for Shulman to make a formal distinction between scholarly and pedagogic content knowledge. Empiricism assumes that the primary function of our language and theories is the objective representation of reality. The work of Wittgenstein and Laudan casts doubt on that assumption; our concepts and empirical beliefs are instead unavoidably shot through with human purposes and expectations. Empiricism assumes that experience can provide us with clear and definitive guidance about how to construct and revise our beliefs about the world. Quine and Kuhn show us that our web of beliefs is always seriously underdetermined by experience, that our beliefs to some degree shape our experience, and that, therefore, an unavoidable element of human choice is present in any system of conceptual, logical, and empirical commitments.

These results demonstrate that an objectivist account of scholarly

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[21]Laudan, *Progress and Its Problems,* 29.

[22]Imre Lakatos describes a scientific research program as consisting of a "hard core" of fundamental theoretical commitments and a "protective belt" of auxiliary hypotheses necessary to produce concrete experimental predictions. He finds that scientists may modify these hypotheses, sometimes in an ad hoc manner, in order to prevent the falsification of the program's theoretical hard core when specific predictions prove false. See Imre Lakatos, "Falsification and the Methodology of Scientific Research Programmes," in *Criticism and the Growth of Knowledge,* eds. I. Lakatos and A. Musgrave (Cambridge; University of Cambridge Press, 1970), 134–138, 142.

[23]Laudan, *Progress and Its Problems,* 22–23.

[24]Ibid., 84–85.

knowledge cannot be depended on to give support to a derivative category of pedagogic content knowledge. Therefore, Shulman must find other grounds on which to base his distinction.

However a further consequence for the relationship of knowledge and pedagogy arises out of the critique of objectivism because new grounds must be found in order to justify belief. And so we find, in the move away from objectivist epistemology, a corresponding move towards what given communities agree upon as providing justification for belief. Rorty refers to this alternative as one grounded in human solidarity rather than in objectivity.[25] Justification of belief, therefore, is relative to particular human purposes and enterprises. In advancing and attempting to justify their claims, scholars must be attuned to the meaning that their fellow human beings attach to their experience; they do not and cannot simply attend to the messages that nature whispers to them. Scholars must be concerned with the comprehensibility and teachability of their assertions, that is, with whether those "representations" can find a meaningful place in others' webs of belief. In other words, the justification of scholarly knowledge is inherently a pedagogical task, and successful scholars must engage in the sort of pedagogical thinking supposed by Shulman to be a hallmark of pedagogic reasoning.

John Dewey on Teaching and Scholarship[26]

In the preceding section, we have ruled out an objectivist theory of knowledge as the basis for Shulman's distinction between scholars' and teachers' knowledge of subject matter. Scholarly knowledge is not an authentic depiction of the world, purged of all traces of the knower. Once deprived of this sustaining ideal, the notion of pedagogic versions of objectively derived representations is no longer justified. Nevertheless, it may be the case that the distinction can be made on other grounds.

John Dewey gives an account of subject matter knowledge that avoids the perils of the standard objectivist picture, which he refers to critically as the "spectator theory of knowledge."[27] In Dewey's opinion, one of the

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[25]Richard Rorty, "Solidarity or Objectivity?" in *Post-Analytic Philosophy,* eds. J. Rajchman and C. West (New York: Columbia University Press, 1985), 3–19.

[26]Dewey's writings on subject matter knowledge are dispersed throughout his works. The texts that we have drawn on for our reconstruction of his views are the following: John Dewey, "The Child and the Curriculum," (1902) reprinted in *John Dewey on Education,* ed. R.G. Archambault (New York: Random House, 1964), 339–358; "The Relation of Theory to Practice in Education," (1904) reprinted in *John Dewey on Education,* ed. R.D. Archambault (New York: Random House, 1964), 313–338; *Democracy and Education* (1916; reprint, New York: Free Press, 1966); *The Quest for Certainty* (New York: Milton, Balch, & Co., 1929); *How We Think* (Boston: D.C. Heath and Co., 1933); *Experience and Education* (New York: Collier Macmillan, 1938); and *Logic, the Theory of Inquiry* (New York: Harry Holt and Co., 1938).

[27]Dewey, *Quest for Certainty,* 23.

main errors of the spectator theory is that it is the source of a number of pernicious pedagogic practices—especially that of force-feeding children with a diet of facts and ideas that bear the imprint of finished study.

In Dewey's revised account, subject matter is the product of thought rather than something that exists independently of the mind. The error is to think of subject matter, on the one hand, and method, on the other, as a "separation in existence and not as a distinction in thought."[28] For when we give a distinct ontological status to subject matter, we exalt it as a thing to be possessed and diminish the vital processes of acquiring knowledge: "Having a ready-made existence on their own account, [the various subject matters'] relationship to mind is exhausted in what they demand it to acquire."[29]

Dewey's corrective to standard empiricist and rationalist ways of thinking is to make subject matter an expression or formulation of the content of experience. It is the product of reflection on action and represents "a given stage and phase of the development of experience."[30] In this view, subject matter has no immediate claim on the mind of the student and becomes instead a factor in the mind of the teacher. Subject matter "enters directly into the activities of the expert and the educator, not into that of the beginner, the learner."[31]

Are there, then, grounds for supposing, as Shulman and his colleagues suggest,[32] that Dewey's account of subject matter supports the case for its division into scholarly and pedagogic forms? In order to investigate this possibility, it will be necessary to spell out, in detail, Dewey's ideas on subject matter.

Dewey's theory of subject matter knowledge rests on two parallel and related accounts of how thought gives rise to content—a socio-historical account of the development of public forms of subject matter knowledge, and a socio-psychological account of the growth of subject matter knowledge in individual minds.[33] In the socio-historical account, subject matter is viewed as grounded in purposeful social action.[34] It evolves towards various stages of expression through the reflective action of thought on experience. In reality, there is nothing other than experience, and it is only

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[28]Dewey, *Democracy and Education,* 167.

[29]Ibid., 134.

[30]Dewey, "The Child and the Curriculum," 353.

[31]Dewey, *Democracy and Education,* 182.

[32]Pamela L. Grossman, Suzanne M. Wilson, and L.S. Shulman, "Teachers of Substance: Subject Matter Knowledge for Teaching," in *Knowledge Base for the Beginning Teacher,* ed. Maynard C. Reynolds (Oxford: Pergamon Press, 1989), 24.

[33]Dewey, *Democracy and Education,* Chaps. 14-17.

[34]Ibid., 181–182.

by reflecting on it that we come to distinguish method from content. The first stage in this process is undifferentiated knowledge in action, unreflective work, and play. To put it in terms of a distinction popular in analytic philosophy, we know *how* before we know *that*. Subject matter does not exist at this first level because the content is unarticulated and embedded in a matrix of purposeful social action. It finds its expression in actions, not in words. The second stage arises from the first because of our desire to control action and to communicate our thoughts to others. By reflecting on how we perform actions, subject matter and method can be isolated as distinct aspects of "the moving unity of experience."[35] Reflection gives rise, at the second level, to information. It broadens our understanding beyond the restricted horizon of individual action and contributes to building a body of historical and geographical facts and ideas. Science exemplifies the third and most advanced level of organized subject matter knowledge. The concepts, the expressions, and the systematic organization of this knowledge reflect, in this final phase, the logic of scientific inquiry. Science is the "perfected outcome of knowing."[36] In science, "subject matter is organized with specific reference to the successful conduct of the enterprise of discovery, to knowing as a specialized undertaking."[37]

In addition to this historical account of the growth of subject matter within the various disciplines, Dewey also constructs an account of how subject matter knowledge develops in learners.[38] The first stage corresponds to work and play. Knowledge is knowledge in action—we simply know how to perform some socially useful actions. In the second stage, learners are led to reflect on their actions when problems arise and as they develop skill in language because of the desire to talk about what they are doing or have done. These processes expand personal knowledge in action through the creation of information, which is extended along spatial and temporal dimensions. Reflection literally widens the students' horizons. The final stage is that of the expert or scientist. Subject matter knowledge of this kind represents an advanced stage of study and is the product of methodical reflection. It is organized in a logical form so that "every statement shall be of such a kind as to follow from others and lead to others."[39] Thus, subject matter has instrumental value as a means of promoting discovery.

Dewey's account, therefore, allows us to look at subject matter knowledge along two dimensions—one longitudinal and the other horizontal.

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[35]Ibid., 166–167.

[36]Ibid., 108.

[37]Ibid., 190.

[38]Ibid., 184–191.

[39]Ibid., 190.

Along the longitudinal or temporal axis, subject matter is seen developmentally. It emerges from unreflective action as information which is then organized into systematic bodies of knowledge to fulfill the instrumental purpose of generating further inquiry. This perspective affords a view of subject matter as evolving out of action through a maturing process of reflection. Along the horizontal or cross-sectional axis, subject matter is the endpoint of study. It is subject matter that has been organized in such a way that the interrelation of the parts reflects the methods or logic of inquiry.

The longitudinal perspective allows Dewey to relate his socio-historical account of the rise of subject matter to his socio-psychological account of how knowledge develops in learners. The same principles of growth apply to both. Indeed, they are essentially different aspects of the same process: "It cannot be too strongly emphasized that his scientific method is the method of mind itself."[40] But Dewey is not advocating that students should learn a subject by retracing the historical steps that led to the growth of the subject as an area of study. Dewey is not a recapitulationist—an approach to teaching and learning that he explicitly rejects.[41] He notes how different the knowledge in action of modern children is from the knowledge in action of those individuals whose efforts provided the original impetus from which the various sciences grew. Their starting points are not the same. This means that different learners must travel different routes to the same, or similar, destinations.

In consequence, we can reject an implication of the recapitulationist thesis that would solve the problem of the difference between pedagogic and scholarly knowledge of subject matter—that teachers have longitudinal knowledge of subject matter derived from its historical development, while experts' knowledge represents a culminating version of it.

Nevertheless, Dewey is a recapitulationist of sorts, though he prefers to use the term "reconstructionist" to describe his approach.[42] Thus, learners do not retrace the same path that describes the historical development of a particular science. But, they do go through the same invariant sequence of formal levels and employ similarly evolving powers of reflection as they proceed to reconstruct the subject from their own experiences.

Given Dewey's theory of subject matter knowledge, are there grounds for supposing that it justifies a division between pedagogic versions and expert versions of the same area of study? In short, is there a Deweyan answer to the question, "Are there pedagogic forms of subject matter knowledge?" Here we will consider three possible avenues of approach to this question in Dewey's work. The first proceeds on the basis of how Dewey

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[40]Dewey, "Theory to Practice," 328.

[41]Dewey, *Democracy and Education,* 72–73.

[42]Ibid., 76.

conceives of subject matter. The second is tied to his idea about "psychologizing" subject matter.[43] The third derives from his views about how experts and teachers think when they think about subject matter. Our conclusion, to anticipate, is that Dewey's ideas do not justify a distinction between two forms of subject matter knowledge.

As to subject matter alone, Dewey makes no distinction between the knowledge of teachers and scholars. Indeed, he is adamant that teaching is a scholarly profession and that a highly developed understanding of organized subject matter is a prerequisite in effective teaching.[44] His account of subject matter highlights differences between the levels of understanding of children and adults, and not qualitative differences in the mature conceptions of subject matter held by adults. It could be argued, however, that we usually expect, and find, that scholars have a more thorough understanding of the content of their speciality than teachers do. But this would be a difference of degree and not of kind.

One reading of Dewey, however, suggests a different interpretation —one that might lend some credibility to the view that a difference exists in the nature of teachers' and scholars' knowledge of subject matter. In a number of places, Dewey refers to teachers as being concerned with the "interplay" between subject matter and the "pupil's own experience."[45] But what does "interplay" mean in this context? The suggestion is that there is some interaction in the mind of the teacher between the two domains—an interaction that results in a synthesis of the two into a new form of content knowledge. The subject matter has become, in a word, "psychologized." What can a more thorough investigation of Dewey's work make of this claim?

First, although it seems a rather obvious solution to the problem that this article addresses, it is not one that Dewey ever develops, in spite of some incautious remarks about "psychologizing" subject matter.[46] This is "one of his less elegant expressions," as Arthur Wirth rather generously puts it,[47] and one that incorrectly suggests a form of direct action upon subject matter instead of a concern with how it develops in learners.

Secondly, the idea of a synthesis between subject matter and pedagogy to form a new kind of teachable content suggests an approach to teaching

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[43]Dewey, "Child and Curriculum," 351.

[44]Dewey, "Theory to Practice," 328–329.

[45]Dewey, *Democracy and Education,* 183; and "Child and Curriculum," 351.

[46]Dewey, "Child and Curriculum," 351.

[47]Wirth's interpretation of the term "psychologized" is clearly at odds with the idea that it represents a form of content that has been adapted to learners. "The more the teacher is aware of the interests of his students and of the factors in their experience, the more imaginative he can be in establishing situations, raising questions, and suggesting activities that might engage students in an effort to make sense of things for themselves." See Arthur Wirth, *John Dewey as Educator* (New York: Krieger, 1979), 63.

that Dewey explicitly rejects.[48] Imparting content, no matter what form it takes, is for Dewey one of the great evils of traditional pedagogic practice, and one that his alternative account is intent on stamping out.

Thirdly, in his account of the thinking processes of teachers, Dewey makes no place for the power to synthesize new content. It simply does not fit in with his opinions about how teachers think. And when he does bring up the teacher's power to synthesize, he does it to explain how educative activities can be arranged, not how content can be arranged.[49]

And, finally, the idea of interplay, as Dewey appears to develop it in his work, has less to do with how subject matter directly influences instruction and more to do with how teachers create activities and organize the learning environment.[50] Subject matter enters into the calculations of teachers only as an endpoint—a map or formulated statement of experience that summarizes the results of previous journeys.[51] Subject matter provides a standard for the selection (analysis) and arrangement (synthesis) of educational activities.[52] Teachers must be confident that what they get students to do will *finally* lead them to a knowledge of organized subject matter. The teacher's task could be compared to a very elaborate version of one of those party games where one player knows the answer but cannot say what it is. Instead, he or she must provide a set of experiences that will lead others to the answer. Knowledge of the endpoint is, of course, essential in making such deliberations. Thus, no transformation of the subject matter is ever required in Dewey's picture of teaching, only transformation of the world in which students act.

A third way of interpreting Dewey suggests another approach based on the plausible proposition that teachers and scholars reason differently about subject matter. In this view, it is not what teachers know that makes them different from scholars but what they do with what they know. Teacher thinking, in Dewey's view, represents subject matter knowledge as an endpoint, a goal that provides information about how to structure, select, and sequence students' experiences. The means of accomplishing this goal is a series of interconnected activities that provide learners with educative experiences. The series forms a "vital movement" or continuity

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[48]Dewey warned that there were dangers in altering subject matter for students. "Such modification and revision as [subject matter] undergoes are a mere elimination of certain scientific difficulties, and the general reduction to a lower intellectual level." Such a procedure "evacuates" subject matter of its logical features so that "the child gets the advantage neither of the adult logical formulation, nor of his own native competencies of apprehension and response." Dewey, "Child and Curriculum," 352–354.

[49]Dewey, *Democracy and Education,* 170–172; and *Experience and Education,* 84–88.

[50]Dewey, *Democracy and Education,* 183.

[51]Dewey, "Child and Curriculum," 350.

[52]Dewey, *Experience and Education,* 84.

of experiences between knowledge in action and knowledge of science.[53] The endpoint is both knowledge of method and knowledge of subject matter. Thus, formulations of subject matter serve teachers as maps of the terrain that students have yet to explore. Such maps are of no immediate use to learners. Dewey does not want to take subject matter, in any form, down to the level of students. Teacher thinking is directed towards the orchestration of experiences for learners. Each experience must open up, through reflection, to a new experience so that by gradual steps each child will mature towards a fuller realization of organized subject matter knowledge.

This type of thinking may strike us as being unique to teaching, but Dewey draws another conclusion. Indeed, his purpose seems to be not to contrast teacher thinking with scholarly method but to reveal how similar they are. Thus, Dewey's identification of pedagogic reasoning with scientific method anticipates the contemporary opinion that exemplary teaching is a form of research. Dewey's point is that mature reflection in teaching shares the same general features as the scientific method of scholars.[54] His first observation is that scholars and teachers alike are guided by leading ideas. For scholars, the leading idea is represented by scientific hypotheses; for teachers, it is organized subject matter. Thus, hypothesis and subject matter are part of a developing system of knowledge. These leading ideas guide the actions of teachers and scholars. They lead the scholar to experiment and the teacher to the construction of educational activities. As a next step, the consequences of these activities must be observed and the results reviewed. Reflection on these processes produces new learning and the differentiation of experience into method and content. All are features of the reflective situation: problem formulation, collection and analysis of data, projection and elaboration of suggestions or ideas, experimental application and testing, and deduction of conclusion or judgment.[55] Thus, in general terms, the method of science and the method of education are all one: "Scientific method provides a working pattern of the way in which and conditions under which experiences are used to lead ever onward and outward."[56] What is true of the onward march of science is true of the onward march of the learner under the reflective, inquiry-driven guidance of the teacher.

Dewey, therefore, give us no reason to hope that there is a difference in the thinking of scholars and teachers when it relates to subject matter. The most we can say is that both put it to different uses: the scholar to construct new knowledge as part of the socio-historical development of

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[53]Ibid., 37–38.

[54]Ibid., 86–88.

[55]Dewey, *Democracy and Education*, 173.

[56]Dewey, *Experience and Education*, 88.

the discipline; the teacher to construct experiences which lead to the growth of subject matter knowledge in learners. But since these two processes are formally identical, the reasoning of teachers and scholars shows more similarities than differences. They are both arts of inquiry that "lead out into an expanding world of subject matter."[57]

Thus, Dewey's work does not support the thesis that scholars and teachers possess different forms of subject matter knowledge. But it does raise the alternative solution that we supported in the section preceding this one. This alternative, which neither Dewey nor Shulman explores, denies that there are pedagogic forms of subject matter knowledge by affirming that all expressions of subject matter are pedagogic. Scholarship and teaching, therefore, are connected through their unity of purpose—the common aim of the communication of ideas—not divided by any formal differences. There are more ways to teach than those that are commonly practiced in school and college classrooms. On the basis of a unified conception of teaching and scholarship, we can begin to appreciate the multiplicity of ways of representing and teaching subject matter, and avoid a dualistic account of subject matter knowledge.

Our conclusion, then, is that scholarship is no less pedagogic in its aims than teaching. Subject matter is always an expression of a desire to communicate ideas to others, whether they happen to be members of the scholarly community, newcomers to the field, or laypersons. Differences within the form and content of various expressions of subject matter reflect an understanding of differences in the backgrounds of potential audiences and the circumstances of the subject matter's formulation. In short, no formal difference exists between subject matter knowledge and pedagogic content knowledge. To the degree that it is addressed to particular audiences, all subject matter is pedagogic.

Reflections on Teaching and Scholarship

What is to be made of the claim that no clear epistemological distinction exists between teaching and scholarship? What follows when we understand teaching and scholarship as interrelated practices? In the remainder of this article, we offer a brief consideration of some of the consequences of our arguments.

First, we must recognize a blurring of the boundary between teaching and scholarship. We can no longer feel confident that pedagogy can be understood in isolation from subject matter, nor scholarship as divorced from teaching. At the beginning of this article, we credited Shulman with reminding us of the importance of scholarship to pedagogy by directing our attention to the vital role that subject matter plays in teaching. But our arguments have an additional consequence: there is no such thing as pure scholarship,

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[57]Ibid., 87.

devoid of pedagogy. The scholar is no scholar who does not engage an audience for the purposes of edifying its members. Scientists are not absolved from the responsibility of passing on new ideas simply because they see themselves as researchers. But more than that, success in science, or any other form of scholarship for that matter, is an inherently pedagogic affair. We are not speaking here of the popularization of ideas, although some great scholars are great popularizers; we are arguing that ideas are themselves intrinsically pedagogic. To understand a new idea is not merely to add to the existing stock; it is also to grasp hold of its heuristic power— its power to teach. Explanations are not only *of* something; they are also always *for* someone.

Shulman portrays teachers as different from scholars because he believes they have a special kind of subject matter knowledge; Dewey does likewise because he believes they possess a distinctive interest in the way knowledge grows in learners. In the account we have developed here, it is more fruitful to view teachers and scholars as members of a community, bound together by their common intellectual vision and communicative purpose. The community of teacher-scholars shares, on the one hand, an evolving web of language and belief and, on the other, the common social purpose of bringing ideas to bear on the lives of others.

To be sure, the various members of this intellectual community may serve this mutual aim in different ways. Some focus their efforts on making parts of the web of language and belief available to the general populace; some concentrate on educating future teacher-scholars; and still others focus on novel applications of these ideas to understanding ourselves and living in the world. This division of labor implies that various teacher-scholars have a command over different parts of the web and in different degrees. Just as chemists working on different scientific problems need to know different aspects of chemistry so, too, do those who teach undergraduates, high school juniors, and fourth graders.

The stock of concepts and ideas that defines each community is a tool kit for carrying out the various tasks that teacher-scholars' roles require. Sometimes these tools seem inadequate to the tasks and need to be altered or supplemented. But there are constraints in the modifications that can be made. Those changes must above all be intelligible and useful to other members of the teaching-scholarship community.

Most are familiar with the idea that scholarship places constraints upon teaching. When William Harvey, "Inventor of the Circulation of the Bloud,"[58] explained the function of the heart by comparing it to a pump, he placed a constraint upon the freedom of teachers to explain it in other ways. This is not to say that teachers are bound to reiterate the standard

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[58]See O.L. Dick, ed. *Aubrey's Brief Lives* (Ann Arbor, Michigan: University of Michigan Press, 1962), 128.

explanation, or that learners must submit to incessant repetition. Explanations do vary in relation to the audience, but they must also satisfy the standards and expectations of the relevant teaching-scholarship community.

Teaching, however, also places constraints on scholarship. The university researcher is not free to invent language or to propose beliefs that do not lend themselves to communication. And these beliefs are not only to be communicable to other university colleagues but, in some appropriate way, to school teachers and their students as well. Failure of communicability marks the demise of a field as an ongoing enterprise.

One feature that distinguishes our view from those of Dewey and Shulman is precisely this mutuality of influence between teaching and scholarship. Changes in language and belief that originate and succeed in one part of the teaching-scholarship community unavoidably ramify throughout the whole web. Just as developments in research affect what is to be taught, so, too, do new models, explanations, and metaphors, fashioned for the teaching of particular audiences, modify the possibilities for the future growth of knowledge. Robert Scholes has made exactly this same point with regard to the connection between English teaching and literary theory:

> I see clearly, now, not only certain ways in which theory can help
> us solve curricular and pedagogical problems; I see also how teaching
> can help theory pose and elaborate these problems. I see that teaching
> and theory are always implicated in one another.[59]

There are, then, many ways to be a successful teacher-scholar. One way is the professor addressing university colleagues; another is the kindergarten teacher orchestrating the activities of a class of five-year-olds. What unites them is participation in an intellectual community of shared language, belief, and purpose, and a concern with the communicability of ideas to different audiences.

It follows that the current practice of locating subject matter mastery in the various academic departments and pedagogy in the schools of education is not only an artificial division but a potentially harmful one. Teachers in the academic disciplines cannot be excused from the responsibility of communicating ideas, nor can teachers in colleges of education be absolved from understanding the ideas to be communicated. Moreover, our arguments do not support the case for conceiving of teaching as a distinct profession with a unique knowledge base. Rather, they imply that teachers and scholars must be counted as part of the same community, with the additional burden of responsibilities that such membership entails. In sum, our

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[59]Robert Scholes, *Textual Power: Literary Theory and the Teaching of English* (New Haven: Yale University Press, 1985), ix.

arguments imply, though for somewhat different reasons, what Dewey also concluded:

> The present divorce between scholarship and method is as harmful upon one side as upon the other—as detrimental to the best interests of higher academic instruction as it is to the training of teachers.[60]

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[60]Dewey, "Theory to Practice," 331.

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