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## A Critical Complex Epistemology of Practice

*Joe L. Kincheloe*

In the 1980s questions began to emerge in a variety of fields about how one learns to engage in the practice of a profession. Profound questions were raised about the role of professional knowledge and how it is used in the process of educating practitioners in a variety of domains. Teacher educators have learned from researchers studying situated cognition and reflective practice that practitioner ways of knowing are unique, quite different from the technical ways of knowing traditionally associated with professional expertise. Indeed, professional expertise is an uncertain enterprise as it confronts constantly changing, unique, and unstable conditions in social situations, cultural interchange, sci-tech contexts, and, of course, in classrooms.

The expert practitioners studied by socio-cognitivists and scholars of reflective practice relinquished the certainty that attends to professional expertise conceived as the repetitive administration of techniques to similar types of problems. Advocates of rigorous complex modes of professional practice insist that practitioners can develop high-order forms of cognition and action, in the process becoming researchers of practice who explore the intricacies of educational purpose and its relation to everyday life in the classroom. This paper explores what exactly such higher-order forms of cognition and action might look like in relation to the process of learning to teach.

### Two cultures: Researchers and Practitioners— the Complex Relationship between Research and Practice

Grounded on the assumption that traditional scientific notions of the relationship between knowledge produced about education and practice, the paper calls for more research on the complex nature of this relationship. At present a culture gap often exists between practitioners and many researchers. Many teachers have come to believe that educational researchers have little to say that would be helpful to their everyday lives. In this context research and practice are separate entities—educa-

tional researchers are captives of their epistemologies and their professional culture's own agenda. They are captives in the sense that they have tended to ask only those questions answerable by the empirical methods of physical science. One discipline or paradigm is not adequate to the task of understanding the network of the intricate and ambiguous human relationships making up a classroom or a school. Researchers need a multi-dimensional set of research strategies to help understand such school/classroom interactions and their relationship to deep social, cultural, and economic structures. In the technical rationality of much educational research, the attempt to translate such intricate relationships into pedagogical knowledge often renders the data gathered meaningless in the eyes of practitioners. Until researchers gain a deeper understanding of the relationship between knowledge and practice—the epistemology of practice—the gulf between researchers and practitioners will remain.

Many educational research studies depend on observations within strictly controlled teaching situations that have little to do with everyday classrooms. What teachers perceive as the irrelevance of such research often relates to what Lee Shulman labeled “task validity,” that is, the degree to which the environment in a laboratory is analogous to the complex environment of the classroom. Informed by the practical knowledge, many teachers have intuitively questioned the generalizability of laboratory research findings to the natural setting of the classroom. Teachers have suspected the inapplicability, but too often the social science, psychological, and educational research establishment was not so insightful. The “normal science” of the dominant paradigm assumed that laboratory research findings were the source of solution applicable in every classroom setting. Such a technical science has failed to understand that every classroom possesses a culture of its own with particular problems and solutions to such problems.

A more complex educational science accounts for knowledge of what has happened previously in a classroom—how classroom meanings, codes, and conventions have been negotiated. An educational researcher simply cannot walk into a classroom without an understanding of the previously negotiated meanings and expect it to make sense. Indeed, it is even more unrealistic for the researcher to expect that generalizations applicable to other classrooms can be made from this incomplete and often misleading snapshot of a classroom. To understand the complexity of the classroom, more multidimensional, multiperspectival methods must be employed.

A more complex understanding of both the research process in general and research methodology in particular helps educational researchers appreciate that the space between teaching and the outcomes of learning is shaped by a cornucopia of variables. Because of this complexity, the attempt to explain divergence in student performance by reference to a few generalizable dimensions of teacher action is reductionistic and misleading. Central to this paper is the need for recognition of the complex and multidimensional relationship between research and practice. Our goal is not simply to research education but to explore new and more rigorous ways of engaging in such inquiry, to develop modes of research

that lead to the development of practical forms of knowledge with a profound use value for educators.

### Educating Reflective, Scholarly Practitioners Who Consume and Produce Educational Research

Teaching prospective teachers how to teach may be one of the most difficult pedagogical tasks a university assumes. Too often, however, it is assumed to be a mere technical act with little connection to philosophical purposes, politics, social and cultural questions or epistemological perceptions of what constitutes knowledge. Many of teaching methods courses and textbooks that are based on traditional forms of empirical research reduce teaching to step-by-step recipes removed from any consideration of pedagogical purpose that transcends the mechanical transfer of data from teacher to student. Our theme of complexity emerges once again, as we consider that all performative activities from being a standup comic to teaching an algebra class are consistently interrupted by unexpected circumstances. In such a surprising situation initiates a form of reflection-in-action (Schon, 1995) that helps the entertainer or the teacher reconsider her understanding of the circumstance and the strategies she has been employing to accomplish particular goals. In many situations reflection in light of such surprises may lead to a reconceptualization of the goals themselves.

A scholarly, rigorously educated, reflective practitioner possesses the ability to restructure her conceptual framing of a situation—not only at the micro-level as it involves rethinking a technique but also at the meso- and macro-level as it involves school policy or socio-cultural understanding. In these contexts the practitioner has developed a professional expertise that allows her to improvise a new course of action that can be tested and interpreted on the spot. A teacher may employ such a form of professional cognition when she encounters a student whose learning style does not fit particular textbook archetypes. The teacher's ability to diagnose a learning problem resulting in such a circumstance involves a wide variety of social, cultural, psychological, cognitive, and pedagogical insights as well as the ability to conduct research in the immediacy of the classroom experience. Such reflection-in-action involves these activities and the questioning of the efficacy of particular assumptions, strategies, or beliefs involving one's own educational work.

Thus, the knowledges of professional education and educators are of a different variety than the propositional knowledge of science. Such propositional knowledge—e.g., more time on task improves test scores—is not especially helpful to teachers who have to deal with the ever-changing dynamics of everyday life in schools. When researchers assume that teachers simply apply this propositional knowledge to their *technologies* of teaching, they make an epistemological mistake. Such application assumes an unproblematic relationship between research and practice. A complex understanding of educational research appreciates the multidimensional interaction between knowledge of education and educational practice. Educational

research as it is conceptualized here is not produced for practitioner application but for the more interactive and complex purpose of cultivating educational insight. A complex articulation of educational research *informs* practitioners, it does not *direct* them. Indeed, it respects the interpretive ability of teachers and educational leaders to discern what, if anything, such research helps them understand about the context(s) in which they operate.

The assumption on which a more complex form of teacher education research rests is that teachers are reflective, scholarly professionals not technicians who merely follow the directives of superiors. More reductionistic modes of educational research support a classroom-based model of teacher education that inculcates teacher education students with empirical knowledge about teaching, subsequently placing them in field experiences where they implement such findings. The relationship between such knowledges and educational practice are often insufficiently discussed. Indeed, analysis of the types of educational knowledges studied and the diverse types of knowledges that exist in the universe of educational research are typically ignored.

In the reductionistic model there is no need for “mere practitioners” to waste their time with such questions. Moreover, the reductionistic model assumes that the empirical research produced by experts is of a universal variety—that it is true and applicable in all times and all places. A more complex view maintains that knowledge derived from such research must always be viewed in light of the unique circumstances of particular cases. Thus, teachers must view such knowledge within the social, cultural, economic, linguistic, and philosophical contexts of their own experiences. Thus, the complex view of research, practice, and their relationship transcends an epistemological model that promotes an evidence-based set of technical teaching skills for universal adoption by the teaching profession. A teacher education program based on the reductionistic model simply operates to *deliver* the certified technical teaching skills to students. Questions of conceptual frameworks and overall philosophies of professional education are irrelevant in the reductionistic context (Munby & Russell, 1996; Vavrus & Archibald, 1998; Ferreira & Alexandre, 2000).

A central dimension of what we are exploring here involves the positioning of teachers in the larger understanding of educational research and its relation to practice. In addition to its epistemological and scientific flaws the reductionistic orientation to research and practice contributes to the deskilling of teachers. As referenced above, teachers in this model are not viewed as professional knowledge consumers and producers or expert interpreters of educational research and its relationship to the contexts in which they are operating. Teachers in the reductionistic context are deprofessionalized, molded into functionaries who are not trusted to use their professional judgment. In this context the sanctity of the entire democratic educational process is compromised, as teachers are induced to adhere to standardized techniques mandated from above, from external entities.

We are dedicated to a philosophy of research and practice that respects teachers and their professional prerogative to diagnose and assess their students. In this

process such teachers not only have the right but are also encouraged to develop curricular and pedagogical strategies to address specific classroom problems. Expert developed systems never function as well as rigorously educated individuals with an understanding of systemic purpose and the multiple contexts that shape the system, its stated and unstated goals, and professional practice within it. Obviously, such rigorously educated practitioners do not operate by applying an externally produced set of rules but on the insight gained from understanding the system from many angles combined with their professional experience. These insights are central to our complex epistemology of practice.

### Epistemological Mismatch: Scientific Theories and Problems of Practice

The epistemological problems outlined above are not exclusive to teacher education but represent a long history of problems with knowledge and practice in the professions. The diverse professions bought into an epistemology of practice that assigned researchers to the task of applying systematic knowledge to the problems of practice. A form of technical rationality emerged in these higher educational contexts that viewed practice as primarily a process of adjusting the techniques of practitioners to clear and measurable system goals (Schon, 1995). Thus, educational research in such an epistemological context involves finding out what practitioner techniques will most efficiently raise test scores.

Thus, the complications of a complex enterprise such as teacher education are solved: teacher educators simply pass along the findings of research to the empty minds of passive students. The role of the teacher education researcher here involves creating a “correct” knowledge base for teaching. In our complex epistemology of practice the concept of practice itself is problematized. In this conceptual context educational researchers explore not only diverse forms of educational knowledge but also their utility (Munby & Russell, 1996; Geeland & Taylor, 2000). What is the practitioner able to do via her encounter with this particular set of understandings? What does the knowledge we are producing look like when encountered and conceptualized in diverse contexts of practice?

Contemporary forms of epistemology of practice emerging out of initiatives such as the No Child Left Behind (NCLB) legislation are in many ways a recovery of epistemologies dominant in mid-twentieth century scholarship. Such *modus operandi* were especially common in post-World War II schools of business. Business educators of the era maintained that there existed a discrete set of managerial tasks in all organizational settings. Business researchers would produce research on the most effective way to perform such tasks and formal university educational programs would be established to *train* managers how to operate on the job (Whitley, 1995). Of course, what such managers encountered when they graduated from such programs is that standardized managerial skills are not very helpful in the diverse

and multidimensional situations encountered in everyday commerce. The world of business is much too complex to employ standardized strategies designed for ideal situations quite different than the messy ones encountered on a daily basis. Being a manager like being a teacher requires a synthesis of multiple knowledges, ad hoc thinking and action, and a facility for an informed improvisational ability. The universal knowledges of reductionistic science do not deal with such complexity.

Of course, one way of dealing with the relationship between research and practice has been to ignore academic knowledges about practice and focus instead on trading stories of “real-world experience” with student practitioners. Obviously, such a strategy is ill advised, but one can understand the frustrations that lead to such a professional curriculum. Such stories *are* important and have a place in professional education simply because much of knowledge of practice resides in the context in which professional activities take place. This situated nature of professional knowledge, this knowing-in-action is an epistemological form that helps teachers deal with the ambiguous, mercurial, value-laden, and interpersonal dimensions of practice. Indeed, the problems of such practice are not merely technical but moral, philosophical, social, political, ad infinitum in character. Knowing-in-action subverts the reductionistic epistemology of practice with its notion that theory precedes practice. In this positivist context professional education students get the theory—the correct way to teach—in classroom courses and then put it into practice in the school setting (Hoban & Erickson, 1998; Munby & Russell, 1996).

Obviously, we are profoundly concerned with the failures of the technical-rational model of teacher education. Central to this failure is the positivist model’s lack of concern with questioning the meaning of theory and concurrent devaluing of the need for analyzing the complex, multidimensional relationship between theory and practice. As noted above this concern with positivist theory and its relationship to practice should not be interpreted as a rejection of theory and a retreat to an undertheorized notion of professional practice. Understanding these dynamics we are interested in developing and studying complex forms of teacher education that don’t simply *apply* the knowledges produced by various disciplines but instead interpret the insights produced by various academic disciplines in relation to the purposes, ethics, political and socio-cultural dimensions, and technical problems of educational practice. This is a different task, than the one delineated in the technical-rational model (Ferreira & Alexandre, 2000).

In this context we are deeply interested in exploring the relationship between science and experience, especially, of course, as this interaction relates to the domain of learning to teach. Technical science is much more successful when it operates in domains where the bifurcation of knowledge and experience is possible—e.g., “pure research” settings. Once knowledge production is situated in a context where the separation of knowledge and experience is not possible—e.g., professional schools and professional education—numerous problems emerge. These professional settings with their unique demands of science have not been granted sufficient attention by

the academy. The problems and enigmas encountered in such contexts have many times not been deemed worthy of extensive research. Thus, the insights needed to improve the quality of professional knowledge production and professional education have been neglected. In this important domain there is a profound need for rigorous research informed by the epistemological insights delineated here.

With these concepts in mind professional educators begin to discern that rigorous educational practice transcends the simple application of scientific knowledge to the act of teaching. With this understanding in place the teacher education and the professional practice we envision involves much more than prospective teachers simply learning proscribed curriculum knowledge, replicating certified classroom management and motivation skills, and implementing practices designed to raise student test scores. Indeed, our complex vision involves studying the ways that teachers can develop the multidisciplinary-informed wisdom to understand the impact of particular social, cultural, political, economic, and ideological contexts on the functions of schools and the performances of diverse students, to appreciate the educational effects of specific forms of educational/school organization, to discern the consequences of certain cognitive theories on the nature of the teaching and learning that takes place in a school or a system, to uncover the assumptions about the role of teachers embedded in particular pedagogical strategies, and to gain the ability to imagine diverse ways of organizing educational experiences when professional diagnoses reveal problems with the status quo (Webb, 1995; Crebbin, 2001).

### Lessons Derived from Practice in a Complex Epistemology

The adept practitioner envisioned in a complex epistemology of practice is a teacher who contextually frames the ill-defined problems she faces. In such a situation the practitioner uses her wide set of understandings to examine the vicissitudes of the educational act. Such forms of practitioner cognition empower the teacher to change her practice by making reasoned interpretations of the situation she faces. Such ways of operating allow the teacher to attack the sticky, ambiguous problems of the briar patch called everyday practice. Technical-rational knowledge of practice tends to ignore the highly important but messy problems of everyday institutional life while focusing on relatively insignificant but well-defined problems. Such well-defined problems tend to be technical—e.g., the five steps to constructing a classroom bulletin board—not ethical or normative.

Thus, the confusing problems of lived practice do not lend themselves to one simple solution that is final. Depending on practitioners' values or normative assumptions, the solution to a problem shared by several practitioners may be acceptable to some but not to others. Values and values contradictions inform educational knowledge and answers to pedagogical questions. Solutions to educational problems will vary from context to context, as a strategy appropriate in an upper-middle class, predominately White school may not be appropriate in a poor school in a

heavily Latino area. Such complexity demands different forms of knowledge and practitioner thinking than the ones represented in a rational-technical model. An important question emerges in this context: what are the characteristics of professional knowledge that makes it useful for practitioners.

The answers to such a question are central to our study of professional education and research. Instead of understanding the dynamic complexity of such a question and the need for rigorous research and analysis, higher education has often retreated to the safehouse of “pure research.” In this conceptually truncated and epistemologically naïve domain professional education is positioned as an “immature discipline” (Ferreira & Alexandre, 2000) because of its immunity to universally valid pronouncements about its practice. Instead of demeaning the discipline because of its complexity, higher education be promoting the study of the relationship connecting research, knowledge and practice. All domains of higher education, all disciplines have much to learn in such study. Indeed, it might be argued that the future of higher education and educationally informed action may reside in this interrelationship. In this context knowledge is viewed less an abstract entity that can be stored in the computer folders of a mechanistic model of the brain and more as a living entity embedded in diverse situations and in practice (Hatton & Smith, 1995; Schon, 1995; Whitley, 1995; Lomax & Parker, 1996).

Raised in a technical-rational culture, practitioners involved in professional education ache for professional educators to tell them what to do. Responding to their students’ pleas to “give us something we can use,” they often succumb to the simplicity of step-by-step procedures—for example, the five ways to teach phonics to first graders. Here one can easily discern the way practice is abstracted from context, from a sense of purpose, or a social vision. When denizens of the modern research university observe such practice based pedagogies, they reel with disdain and condescension. From their exalted positions in the research university the very integrity of higher education is compromised by such low-level activity.

The only alternative, however, they can offer in lieu of such vulgarly practical practices involves passing along particular forms of disciplinary knowledge that is, of course, completely disassociated from the perils of professional practice. Again, questions concerning the relationship connecting research, knowledge and indeterminate zones of practice are erased as they are deemed unfit for serious academic exploration. The idiosyncratic dynamics of situational ambiguity, conflict, confusion, chaos, and complexity are epistemologically estranged from dominant forms of research in many disciplines. A complex epistemology of practice offers an escape from both vulgar practicality and knowledge abstracted from practice. Such an escape employs a variety of research methodological and theoretical discourses—I have referred to this process elsewhere as the bricolage (Kincheloe, 2001; Kincheloe & Berry, 2004). Using the bricolage in a complex epistemology of practice, professional educators explore the disjunctions and the stresses of the interaction of the triad of research, knowledge, and practice. In these zones of interaction researchers of the complex epistemology

of practice can begin to understand how to deal with the research problems presented by these messy domains of ambiguity.

Acting on such understanding, educational researchers/professional educators begin to validate the insights and concerns of practitioners and to take seriously the lived conditions of teaching. Teachers have been telling educational researchers and professional educators for a long time that empirical generalizations about practice have little use value in their teaching. This is why it is so important to think carefully about the types of knowledges that exist in the domain of practice. As we understand the different types of educational knowledges, we can become better equipped to understand how they are best produced, where they fit in a teacher education program, and how we might teach them. Professional education in numerous domains has never devoted sufficient attention to such questions. These inquiries are central to the type of research we propose to do.

Solving a problem or finding all the pieces of a jigsaw puzzle are not the end goals of research constructed within the framework of a complex epistemology of practice. This is not to argue that practitioners need to solve problems they encounter in practice. A key characteristic of the rigorously educated and well-prepared scholar teacher we seek to graduate, however, involves the ability to identify problems in schools and in practice that have not traditionally been viewed as problems. In this domain of scholarly practice teachers learn to ask questions that are normative and philosophical and answer them in relation to larger contextual insights. Such abilities are both scholarly *and* practical—and that is the recipe for good teaching for which we are always searching. Those practitioners capable of such scholarly and practical skills surely have reached a level of practice that could be labeled rigorous. Indeed, in rigorous practice the scholarly and the practical cannot be separated.

This merging of the scholarly and the practical in a framework grounded on a complex epistemology of practice would help professional educators and practitioners in all domains begin a new conversation with one another. It would also help professional educators begin a new conversation with the university community in which they are housed. A central dimension of these conversations revolves around epistemology and epistemological analysis. Unfortunately, epistemology has not been viewed as especially important in teacher education, teaching practice, or in higher education. Even a few philosophers I have spoken with about these matters find the *applied* use of epistemology strange in “practical” contexts. Calls for scholar-practitioners to construct their own knowledges in both curricular and practice-based domains still seem out of step with the dominant impulses of professional education and the academy in general (Noone & Cartwright, 1996; Munby & Russell, 1996; Goodson, 1999). It is central to our understanding of the research, knowledge, and practice triad that these dominant impulses be addressed in our research.

### The Move to Critical Complexity

At this point it is important to argue for a more rigorous epistemology of practice, one that understands the complications of lived reality and educational practice. The epistemological concept of critical complexity helps us move in such a direction. On one level, the notion of the web of reality is merely a metaphorical way to describe the importance of context in the construction of knowledge, human consciousness, and just action. The more we understand the various contexts in which teaching and learning take place, the more we appreciate the complexity of the processes. The more of these contexts with which educators are familiar, the more rigorous teaching and learning become. I am not arguing here for rigor for rigor's sake. The problems of teacher education and teaching are multi-dimensional and are always embedded in a context. The more work critical scholars studying cognition produce, the more it becomes apparent that a large percentage of student difficulties in school result not as much from cognitive inadequacy as from social contextual factors. Teachers need a rich understanding of the social backgrounds of students, the scholarly context in which disciplinary and counter-disciplinary knowledges are produced and transformed into subject matter, and the political context that helps shape educational purpose.

In the neo-positivistic schools of the contemporary era, learners' lives are de-contextualized. When we examine the contexts and relationships connecting learner, culture, teaching, knowledge production and curriculum, teachers begin to move into a more complex paradigm. In this "zone of complexity," learning is viewed more as a dynamic and unpredictable process. As a complex, changing, unstable system, it resists generalized pronouncements and universal steps detailing "how to do it." Complex systems interact with multiple contexts and possess the capacity for self-organization and creative innovation. Each teaching and learning context has its unique dimensions that must be dealt with idiosyncratically. Our understanding of educational purpose is also shaped by the complexity of these contextual appreciations. Teacher educators and teachers who are aware of this complexity embrace an evolving notion of purpose always informed and modified by encounters with new contexts. This act rids teachers of the burden laid on them by a positivistic epistemology of practice.

Teachers informed by this critical complex epistemology act on these contextual insights to not only help understand a variety of educational knowledges but to grasp the needs of their students. In the critical complex orientation, such concerns can never be separated from the socio-political context: macro in the sense of the prevailing *Zeitgeist*; and micro as it refers to the context immediately surrounding any school. Critical teachers listen to marginalized voices and learn about their struggles with their environments. With these insights in mind, teacher educators and teachers delineate the effects of the contemporary political context shaped by corporations and economic interests; they build deep relationships with local communities, community organizations and concerned individuals in these settings. In this setting, students gain new opportunities to learn in not only classrooms but in unique community learning

environments. Here they can often address particular socio-political dynamics and learn about them in very personal and compelling ways.

Teachers informed by a critical complex epistemology of practice place great emphasis on the notion of context and the act of contextualization in every aspect of their work. When problems in their teaching arise, they stand ready to connect the difficulty to a wider frame of reference with a broad array of possible causes. When pedagogical problems fail to meet the criteria of an archetype, these teachers research unused sources and employ the information acquired to develop a larger understanding of the interaction of the various systems involved with the difficulty. When teachers fail to perform such an act of contextualization, students get hurt.

For example, a student who is doing poorly in school may be viewed as lacking intelligence. Upon contextualization, teachers may find that the student is disturbed by a problem at home or by an undiagnosed illness. His or her lack of academic success may have nothing to do with the question of ability. When teachers do not contextualize, they tend to isolate various parts of a pedagogical circumstance and call each a problem. They tinker with components of the problem but never approach its holistic nature. Educational data, for example, derive meaning only in the context created by other data. Context may be more important than content. These insights change the way educational professionals approach their work.

As is often the case, John Dewey wrote decades ago of these contextual dynamics. In the second decade of the twentieth century, Dewey observed that many thinkers see knowledge as self-contained, as complete in itself. Knowledge, he contended, could never be viewed outside the context of its relationship to other information. We only have to call to mind, Dewey suggested, what passes in our schools as acquisition of knowledge to understand how it is decontextualized and lacks any meaningful connection to the experience of students. Anticipating the notion of a critical complex epistemology and a postformal (Kincheloe & Steinberg, 1993) cognition, Dewey concluded that an individual is a sophisticated thinker to the degree to which he or she sees an event not as something isolated “but in its connection with the common experience of mankind” (Dewey, 1916, pp. 342-43). To overcome the reductionism that has plagued education and allowed for its technicalization and hyperrationalization, critical educators must take Dewey’s insights into account.

What we label knowledge, the ways it is arranged and presented, the ways it is taught and learned, and what is considered an appropriate display of having learned it is inseparable from the way we view the world, the purposes of education, the nature of good society, and the workings of the human mind. Such issues are connected to issues of power and questions of who is entitled to promote his or her view of the world. Thus, the contemporary effort to hold educators accountable—a key feature of current discourse on educational reform—is not some simple process where experts merely decree the proper instrument to measure the quality of teaching. Instead, it is part of a larger struggle between proponents various worldviews, social visions, and conceptions of what it means to be human. A critical complex

pedagogy maintains that in order to contribute to the effort to improve education, teachers, students, parents, politicians, and community members must gain a more textured understanding of the momentous issues being discussed here.

The worldview and epistemology that support standardization reforms assume that absolute forms of measurement can be applied to human endeavors such as education. The teaching and learning processes, advocates of standardization believe, are sufficiently consistent and stable to allow for precise measurability. The strategies that educators use and the factors that produce good and bad student performance can be isolated and even expressed in mathematical terms. Therefore, because questions based on students' acquisition of selected bits of knowledge can be easily devised and we can determine a student's and a teacher's competence with little difficulty because such measurements can be accurately made, advocates of reductionist standardization see little complexity in the effort to hold teachers accountable. Critical educators aware of a complex epistemology of practice want to move beyond this simplified model, to help all parties understand the multiple contexts that shape in diverse and sometimes conflicting ways what is going on in such a process. Despite the pronouncements of many experts, the evaluation process is more complicated than simply designating the mastery of a fragment of content as an objective and then determining if it has been achieved.

Regardless of a critical complex pedagogy's recognition of the complications and loaded assumptions of this evaluation process standardized reform movements continue to hold sway in the public conversation about education. One reason for this may involve the simplification process referenced here—they are easy for everyone to understand. Simplicity sells, complexity doesn't. "We can keep close tabs on student performance at the school level," the proponents of educational standardization tell the public. Using our mathematical measurement of student acquisition of content, they continue, we can compare the performance of schools, school districts, states/provinces, and nations regardless of the contextual differences that make them unique. All of these measurements and comparisons are guided by a *faith* in the value of standardized, content-based tests and the knowledge they produce. The faith in the meaning of what is measured by such tests is not grounded in some form of rigorous empirical evaluation. Indeed, such a process is the quintessence of reductionism.

The idea that such tests measure student achievement or ability and teacher effectiveness is an interpretation—nothing more, nothing less. Obviously, those of us who embrace a critical complex pedagogy have no trouble with interpretations—all knowledge is produced by an interpretive process. The problem here is that advocates of standardization do not reveal the interpretive aspects of the testing process; they present the data and its meaning as scientifically validated truth. A rigorous analysis of how such truth is produced reveals many interpretive (subjective) steps in the process. A critical understanding of knowledge induces us to ask that the reasons for particular ascriptions of test meaning be provided.

Concurrently, such a critical stance moves us to abandon claims of objectivity in such an accountability process, such an epistemology of practice.

Guided by a leap of faith in what tests tell us about the educational process—is the district wealthy? Are there many formally educated parents? Does every child come from a family whose first language is English? *ad infinitum*—advocates of standardized reforms have unleashed a process where students and teachers will be ranked and ordered to an unprecedented degree. Once students are placed in the low rankings, it becomes extremely difficult to get them out. Thus, reductionist educational reforms along with the testing and the ranking that accompany them are willing to construct an entire educational system including its purposes, rewards, and punishment structures on a faith in the worthiness of an unexamined mode of knowledge production and standardized testing process. In the norm-referenced measurements used in this context there must be winners and losers.

The fact that there are losers “proves” the system’s rigor. Students are pitted against one another in a fierce competition for restricted rewards. As teaching and learning are reduced to knowing what, meaning is lost. Tragically, particular patterns begin to emerge involving which demographic groups tend to succeed when schools are arranged in this manner. Often students who come from lower socio-economic and non-white homes do not have the benefit of a parent who has a college degree. In homes where parents perform low-skill jobs, families may not see schoolwork in the same way as upper-middle class, white, English speaking students. Studies of the social context of schooling point out that poor and racially marginalized students have learned to view academic work and the testing of technical standards as unreal, as a series of short-term tasks rather than activities with long-term significance for their lives.

Without such compensation or long-term justifications, such students may display little interest in academic work. Their poor performance on the tests and subsequent low ranking is viewed in the context of standardization as a lack of ability and academic failure. Their faith in the testing process moves educators to issue a scientifically validated assessment of cognitive inferiority to such students. Such a decontextualized, reductionistic view of the complex process of schooling and students performance in unacceptable—indeed, it is socially dangerous as it contributes to an unfair, unjustifiable sorting of the haves and the have-nots. Teaching is simplified, teachers are deskilled, and students who fall outside particular “mainstream” demographics are severely punished. Even students from the mainstream are subjected to an inferior, simplified education. Even despite the fact that many of them may succeed in the system of rewards, their scholarly abilities are undermined and their view of themselves and the world obstructed. A critical complex pedagogy that understands these epistemological dynamics takes on an urgent importance in this social context, as it attempts to rectify the human damage caused by an uncritical view of knowledge—this positivist epistemology of practice.

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