

The Curriculum Studies Reader

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The Four R's—An Alternative to the Tyler Rationale

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The three R's of "Readin', 'Ritin', and 'Rithmetic" were late nineteenth- and early twentieth-century creations, geared to the needs of a developing industrial society. Reading was the functional reading of sales slips and bills of lading, combined with the inspirational stories of Horatio Alger and the moral aphorisms of McGuffey. Writing was literally penmanship, with the Palmer method introducing a ledger-oriented style in the first grade. Such cursive training had to begin early, for by the fifth grade half of those who had entered as first graders had left. Arithmetic, not mathematics, was essentially column addition and subtraction, with algorithmic multiplication and division coming in the later elementary years. Again, the emphasis was on store clerk functionalism, keeping the sales slips and ledgers accurate and neat. Problem solving was introduced as early as the second grade, but it was heavily, if not exclusively, associated with buying in an urban store.

Born in the early 1930s, I had my early elementary school training in these three R's. My word-lists for reading and spelling prepared me for the urban, industrial society my parents and I inhabited. The Palmer method was begun in the first grade, with an itinerant teacher brought in weekly to instruct us in the big O's and C's so distinctive of its style—flowing but clear. From Miss Wiley, Miss James, and Miss Thatcher—the maiden ladies who taught grades one, two, and three—I learned to keep my ten's column digits out of my hundred's column or my unit's column, and *always* beginning with the right column to "bring down" a single digit and to "carry" into the next column any digits left over. Miss Newcomb in the fourth grade made a small modification to this "consonant" method—namely, that with decimals it was the decimal points which needed to form a vertical, unbroken phalanx. Zeros were added to the right of the decimal point to keep the right column, the hundredths (often considered as pennies), in line.

Mr. Bartlett, our corner grocer, was not as good as my triumvirate of maiden teachers at keeping his columns straight. Further, he began his addition with the left, not the right column. When questioned he stated that he wished to make no mistakes with the dollars or dimes and this method assured him greater accuracy with those important columns. Worse, he grouped digits together either in his head or with small notations in combinations equal to ten. This method intrigued me. I passed on my newfound wisdom to Miss Thatcher (married women were not allowed to teach school). She, however, dismissed Mr. Bartlett's methods as heresy. In retrospect, I think Mr. Bartlett was more industrially oriented than Miss Thatcher and maybe even a better pedagogue. In dealing with my own elementary school classes, I have found that much colum-

nar addition—at least of any practical type—has a better “feel” when it is done left to right, thus allowing intuition and estimation to come into play. Further, doing simple columnar work by grouping numerals into combinations of ten not only produces more accurate and quicker answers but also encourages structural and situational thinking—for example, doing 101–49 as 102–50, or maybe as 100–50 with two added on. Such “chaotic ordering” has been a hallmark of my students’ *modus operandi* for many years now—before I read Whitehead or heard of postmodernism; it has generally served them well (Doll, 1977, 1989).

At first glance one does not see a connection between the Tyler rationale and the three R’s. However, a pre-set functionalism underlies both. While Tyler’s frame expands and broadens industrial functionalism beyond the sales slips and ledgers of the three R’s, the assumption of pre-set goals still exists. In this frame, *goals* do not emerge—as Cvitanovi? suggests they should—by “playing with” experiences; rather, goals are pre-determined as are the *experiences* and *methods* for developing those experiences. All are firmly in place before any interaction with students occurs. *Evaluations* are designed to correlate the experiences only with the pre-set goals, not to explore what the students generate personally after reflecting on the experiences. In fact, as was pointed out earlier in the chapter, framing evaluation in terms of generation, reflection, transformation is virtually oxymoronic from a modernist perspective.

So what would serve as criteria for a curriculum designed to foster a post-modern view? What criteria might we use to evaluate the quality of a post-modern curriculum—a curriculum generated not predefined, indeterminate yet bounded, exploring the “fascinating imaginative realm born of God’s laughter,” and made up of an ever-increasing network of “local universalities?” I suggest the four R’s of Richness, Recursion, Relations and Rigor might serve this purpose.

Richness. This term refers to a curriculum’s depth, to its layers of meaning, to its multiple possibilities or interpretations. In order for students and teachers to transform and be transformed, a curriculum needs to have the “right amount” of *indeterminacy, anomaly, inefficiency, chaos, disequilibrium, dissipation, lived experience*—to use words and phrases already described. Just what is the “right amount” for the curriculum to be provocatively generative without losing form or shape cannot be laid out in advance. This issue is one to be continually negotiated among students, teachers, and texts (the latter having long histories and basic assumptions that cannot be neglected). But the issue of the curriculum needing disturbing qualities is not to be negotiated; these qualities form the problematics of life itself and are the essence of a rich and transforming curriculum. Another way to state this is to say that the *problematics, perturbations, possibilities* inherent in a curriculum are what give the curriculum not only its richness but also its sense of being, its *dasein*.

The main academic disciplines taught in schools have their own historical contexts, fundamental concepts, and final vocabularies. Hence, each will interpret richness in its own way. Language—including reading, writing, literature, and oral communication—develops its richness by focusing heavily (but not exclusively) on the interpretation of metaphors, myths, narratives. Saying this places language within a hermeneutic frame; it is to see language as integrated with culture, as one of the determinants of culture.

Mathematics—a subject in which computational arithmetic plays but a small part—takes its form of richness from “playing with patterns.” Obviously, this can be done *par excellence* with computers—tools that any mathematically rich curriculum should possess—but computers are not a *sine qua non*. Patterns may be seen, developed; played

with in simple number combinations (as with the Fibonacci series) or with geometry of both a Euclidean and fractal sort. Breaking a square into right triangles is an example of the former; the Sierpinski triangle is an example of the latter. At all levels, from kindergarten through graduate school, mathematics can be dealt with meaningfully as “playing with patterns.”

Science—including the biological and the physical—can be seen as intuiting, developing, probing, “proving” hypotheses concerning the world in which we live. This moves science beyond the collection of “facts”—with the assumption these facts are objective bits of reality—into the realm of manipulating, creating, working with facts or information in an imaginative and (thermo)dynamic manner. This view of science is obviously more Whiteheadian than Newtonian, more oriented toward Prigogine than Laplace. The social sciences—those multiple disciplines of anthropology, economics, history, psychology, and sociology—take their concept of richness from dialoguing about, or negotiating passages between, various (often competing) interpretations of societal issues. Here, probably more than in any other discipline, assumptions are questioned. It is these assumed givens that form the foundations of society's mores, norms, standards; and in a democratic society it is imperative these givens be open to dialogue.

Obviously these disciplines, their languages, and histories are not mutually exclusive. The concept of developing richness through dialogue, interpretations, hypothesis generation and proving, and pattern playing can apply to all we do in curriculum. Again, such ideas sound strange to those imbued with a modernist perspective, which helps explain why we need to transcend this perspective to a post-modernist one.

Recursion. From recur, to happen again,¹ recursion usually is associated with the mathematical operation of iteration. In iteration a formula is “run” over and over, with the output of one equation being the input for the next. In $y = 3x + 1$, a y of 4 (if the $x = 1$) becomes the next x , and the new y of 13 becomes the next x , and so on. In such iterations, there is both stability and change; the formula stays the same, the variables change (in an orderly but often nonpredictable manner). As was explained earlier, some interesting complex patterns develop with particular formulae and particular x , y variables.

However, when Bruner (1986) states that “any formal theory of mind is helpless without recursion” (p. 97)—and asserts the importance of recursion for epistemology and pedagogy—he refers less to mathematics and more to the human capacity of having thoughts loop back on themselves. Such looping, thoughts on thoughts, distinguishes human consciousness; it is the way we make meaning. As Bruner says:

Much of the process of education consists of being able to distance oneself in some way from what one knows by being able to reflect on one's own knowledge. (p. 127)

This is also the way one produces a sense of self, through reflective interaction with the environment, with others, with a culture. As I pointed out earlier, such “recursive reflection” lies at the heart of a transformative curriculum; it is *the process* which Dewey, Piaget, Whitehead all advocate. In the 1960s Bruner made a beginning at defining a recursive curriculum with his “spiral curriculum” (1960) and his elementary school social studies program, “Man: A Course of Study” (1966). However, in our then-modernist mode both of these were mis-seen, attaining only popular approval and notoriety. Their power never became evident; the former got lost in the question of calculus for first graders, the latter in the issue of Bruner's patriotism.

In a curriculum that honors, values, uses recursion, there is no fixed beginning or ending. As Dewey has pointed out, every ending is a new beginning, every beginning emerges from a prior ending. Curriculum segments, parts, sequences are arbitrary chunks that, instead of being seen as isolated units, are seen as opportunities for reflection. In such a frame, every test, paper, journal entry can be seen not merely as the completion of one project but also as the beginning of another—to explore, discuss, inquire into both ourselves as meaning makers and into the text in question. This curriculum will, of course, be open not closed; like post-modernism itself, it is Janus-faced, eclectic, interpretive.

Recursion and repetition differ in that neither one, in any way, reflects the other. Repetition, a strong element in the modernist mode, is designed to improve set performance. Its frame is closed. Recursion aims at developing competence—the ability to organize, combine, inquire, use something heuristically. Its frame is open. The functional difference between repetition and recursion lies in the role reflection plays in each. In repetition, reflection plays a negative role; it breaks the process. There is a certain automaticity to repetition that keeps the same process going—over and over and over, as in flash card arithmetic drills or in ball machine tennis drills. In recursion, reflection plays a positive role; for thoughts to leap back on themselves, as in Dewey's secondary experience reflecting back on primary experience, or in Piaget's reflexive intelligence reflecting back on practical intelligence, it is necessary, as Bruner has said, to step back from one's doings, to "distance oneself in some way" from one's own thoughts.² Thus, in recursion it is a necessity to have others—peers, teachers—look at, critique, respond to what one has done. Dialogue becomes the *sine qua non* of recursion: Without reflection—engendered by dialogue—recursion becomes shallow not transformative; it is not reflective recursion, it is only repetition.

Relations. The concept of relations is important to a post-modern, transformative curriculum in two ways: in a *pedagogical* way and in a *cultural* way. The former might, naturally, be called pedagogical relations, referring to those within the curriculum—the matrix or network which gives it richness. The latter might, just as naturally, be called cultural relations, referring to those cultural or cosmological relations which lie outside the curriculum but form a large matrix within which the curriculum is embedded. Both relations are important; each complements the other.

In focusing on *pedagogical relations*, one focuses on the connections within a curriculum's structure which give the curriculum its depth as this is developed by recursion. Here the twin processes of doing and reflecting-on-doing are important, and through these processes the curriculum becomes richer with the passage of time. As Prigogine is fond of saying, time in a Newtonian frame is *reversible and unimportant*; in the dissipative structure frames he studies, it is *irreversible and important* (1988; with Stengers, 1984, Ch. 7). If the universe is already set, time does no more than give one the chance to "see" more of that universe. "Mastery learning" assumes this frame—the student is to take the time necessary to master the material presented to a certain, predetermined level of repetitious proficiency (Torshen, 1977). In a universe of and in process, time takes on a different, qualitative dimension; it acquires a transformative aspect, since development of one sort or another is always occurring. Conditions, situations, relations are always changing; the present does not recreate the past (though it is certainly influenced by the past) nor does the present determine the future (though it is an influencer). So, too, the curriculum frame operating at the beginning of the course is unavoidably different from the curriculum frame operating at the end of the course.

The issue is not difference but degree or quality of difference—whether the difference is a difference that makes a difference.

Recognizing the contingency of relations, and hoping that these relations will be positively and communally developed during the course of a semester, I organize my undergraduate and graduate university courses to enhance this development. Among the devices I use, one is to provide a syllabus that lists common readings for only two-thirds of the course; for the last third various groups choose their readings from a selected list. Class time is devoted not to summarizing these various readings but to interconnecting them to both the common readings and to each other. The quality of discussion improves as the semester *develops*; so, too, papers written early in the semester improve dramatically when rewritten and reframed after utilizing the insights gained. Sometimes the change is transformative.

In junior high classes, where I have often used a set text, I build time-oriented relationships by asking students to reframe the material presented, to choose from or reframe chapter questions, and to deal with the textual material on both a “what-if” (imaginary) basis and a “relate-it-to-yourself” (real) basis. In dealing with elementary school grades, I follow the same general procedures but use far more manipulative materials, story telling, projects, and dramatic presentations. The textbook, throughout all this, is seen as something to revise, not as something to follow. It is the base from which transformation occurs. Curriculum in a post-modern frame needs to be created (self-organized) by the classroom community, not by textbook authors.

It should be obvious in all these personal anecdotes that, in building a curriculum matrix with a rich set of relationships, I have been strongly influenced by Whitehead's (1929/1967) dictum to “not teach too many subjects” but to “teach thoroughly” what I do teach, and to let the main ideas “be thrown into every combination possible” (p. 2).

The concept of *cultural relations* grows out of a hermeneutic cosmology—one which emphasizes narration and dialogue as key vehicles in interpretation. Narration brings forward the concepts of history (through story), language (through oral telling), and place (through a story's locality). Dialogue interrelates these three to provide us with a sense of culture that is local in origin but global in interconnections. Thus, all our interpretations relate to local culture and interconnect with other cultures and their interpretations via a global matrix. Discourse (narration and dialogue) operates, then, within such a double-tiered cultural frame; it does this far more so than within the foundationalist, abstract, and privileged frame modernism posited. Discourse now becomes what Jim Cheney (1989) calls “contextualist” (p. 123)—bound always by the localness of ourselves, our histories, our language, our place, but also expanding into an ever-broadening global and ecological network. It is this double-tiered or dual-focused nature that makes cultural relations so complex.

Recognizing the contextualist nature of discourse helps us realize that the constructs of those participating frame all conversations, all acts of teaching. As teachers we cannot, do not, transmit information directly; rather, we perform the teaching act when we help others negotiate passages between their constructs and ours, between ours and others'. This is why Dewey says teaching is an interactive process with learning a *by-product* of that interaction.

Modernism has not adopted such an interrelational view; it has taken as one of its hallmarks movement beyond the local and contextual to the universal and abstract. Instead of the narrational, it has aimed for, indeed created, the *metanarrational*, the *grand écrit* Lyotard attacks. Teachers, fitting unconsciously into this paradigm—as we

all do—have unwittingly carried on their discourses with students by speaking *ex cathedra*. Too often, teacher explanations have resounded with the authority of God; too rarely have meaningful, interactive, participating dialogues been held.

C.A. Bowers (1987; with Flinders, 1990) has tied the concept of cultural relationships to the ecological crises we face today. In doing this he draws our attention to modernism's overly strong sense of individualism. Individualism has tended to pit humanity against nature (civilization is defined as society improving on nature) and to believe that progress occurs through competition, not cooperation. This is one of modernism's myths founded on beliefs like Bacon's that we should *subject Nature to the hand of man*. This statement would be abhorrent, even sacrilegious, to pre-modern or tribal cultures such as the North American Indian.

But this belief in competition and the virtue of controlling the natural is part of our present day pedagogy and cosmology. Bowers, Griffin, and Oliver (also Lydon, 1992) are among the few curricularists who encourage us to rethink our concept of relations, who see that *cultural relationships* extend beyond our personal selves to include the ecosystem—indeed the cosmos in which we live. Only now, in the past decade or so, are we beginning to develop a cosmic and interrelational consciousness. The challenge of such recognition is twofold: on the one hand, to honor the localness of our perceptions and, on the other hand, to realize that our local perspectives integrate into a larger cultural, ecological, cosmic matrix. Our progress and our existence—as individuals, as communities, as a race, as a species, as a life form—depend on our ability to bring these two perspectives into complementary harmony.

Rigor. In some ways the most important of the four criteria, rigor keeps a transformative curriculum from falling into either "rampant relativism" or sentimental solipsism. In presenting transformation as an alternative to our current measurement frame, it is easy to see transformation as no more than anti-measurement or nonmeasurement. Here, transformation becomes not a true alternative but yet another variation on the very thing it tries to replace. This certainly happened in the progressive and open education movements. Dewey wrestled with the problem in the progressive education movement and wrote "Need for a Philosophy of Education" to explain why progressive education needed to be more than anti-traditional, why progressive education had to have its own foundation and frame. In contrasting his view of progressive education—developmental and transformative—with either the received progressive view (which he considered too romantic) or the established traditional view (which he considered too rigid), he said:

This alternative is not just a middle course or compromise between the two procedures. It is something radically different from either. Existing likes and powers are to be treated as possibilities. (1934/1964, p. 8)

In such a transformative frame, with its emphasis on indeterminacy, shifting relationships, and spontaneous self-organization, rigor wears a very different set of clothes than it did in the modernist frame. Rigor began, at least in the scholastic sense, with the Jesuits' Q.E.D.—"Quod Erat Demonstrandum" (thus it is demonstrated)—from the deductive power of their Aristotelean-based logic. Descartes objected to this logic, replacing it with his own "clear and distinct" ideas—those which no reasonable person could doubt, those he received from God, but also ones he "saw" with his mind's eye. Rigor thus moved from Aristotelean-Euclidean logic to deeply felt perceptions and con-

ceptions. The English empiricists wanted to move rigor yet again, away from subjective states, no matter how personally appealing, to the objective and observable. Here rigor entered a world that could be measured and manipulated. Our present twentieth-century concept of rigor has elements of all these strains—scholastic logic, scientific observation, and mathematical precision.

To think of rigor without these qualities is to call for a virtual redefinition of the concept. Rigor in a post-modern frame requires just this. It draws on qualities foreign to a modernist frame—interpretation and indeterminacy, to mention but two. In dealing with indeterminacy, one can never be certain one “has it right”—not even to the 95th or 99th percentile of probability. One must continually be exploring, looking for new combinations, interpretations, patterns. This is why, in his scientific methodology, Dewey (1933/1971) listed the fourth stage as “the mental elaboration of an idea” (p. 107), “developing the relations of ideas to one another” (p. 113), and “playing with concepts” (p. 182). Here we find echoes and presagings of statements made by Whitehead, Kuhn, Bruner—not to close too early or finally on the rightness of an idea, to throw all ideas into various combinations. Here rigor means purposely looking for different alternatives, relations, connections. Michel Serres does this well, as shown in his wolf and sheep essay, drawing together LaFontaine’s fable and Descartes’ right method.

In dealing with interpretation rigorously, one needs to be aware that all valuations depend on (often hidden) assumptions. As frames differ so do the problems, procedures, and valued results. Rigor here means the conscious attempt to ferret out these assumptions, ones we or others hold dear, as well as negotiating passages between these assumptions, so the dialogue may be meaningful and transformative. As Iser points out, dialogue between reader and text is a two-way process, each has a voice, and in this dialogue there is a combining of determinacy and indeterminacy. Indeterminacy here does not mean arbitrariness; rather, it “allows [for] a spectrum of actualization” (1978, p. 24)—better yet, it allows for a range of possibilities from which actualizations appear. Which actualization does appear for development depends on the interaction process itself, on mixing indeterminacy with determinacy.

So, too, rigor may be defined in terms of mixing—indeterminacy with interpretation. The quality of interpretation, its own richness, depends on how fully and well we develop the various alternatives indeterminacy presents. In this new frame for rigor—combining the complexity of indeterminacy with the hermeneutics of interpretation—it seems necessary to establish a community, one critical yet supportive. Such a community is, I believe, what Dewey thought a school should be.

Notes

1. It is interesting to note that *recursion* (as well as *recur*) is derived from the Latin *recurrere* (to run back). In this way recursion is allied with *currere* (to run), the root word for curriculum.
2. As I’ve said already, it is this distancing of oneself from one’s actions and thoughts that is missing in Schön’s concept of reflection.

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