

**ENCULTURATION
THE NEGLECTED LEARNING METAPHOR IN
MATHEMATICS EDUCATION**

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Enculturation: The Neglected Learning Metaphor In Mathematics Education

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Metaphors for learning abound in education. Sfard (1998) suggested a distinction between the *acquisition metaphor*, in which skills or concepts are learned by students, and the *participation metaphor*, in which “learning a subject is now conceived of as a process of becoming a member of a certain community” (p. 6). As she noted, there has been a shift in the pedagogical discourse in recent years from acquisition to participation metaphors. However, the National Council for Accreditation of Teacher Education (NCATE, 2002) identifies skills, knowledge, and dispositions all as important learning outcomes for educators to address, suggesting that the concerns of an era cannot be reduced to a single metaphor. Consistent with Sfard and with NCATE, in my own work I have identified three key metaphors—learning as *habituation*, learning as (*conceptual*) *construction*, and learning as *enculturation*—that I see as underlying current pedagogical recommendations and disputes: habituation and construction motivating traditional pedagogy; construction and enculturation motivating reform pedagogy (Kirshner, 2002).

These metaphorical notions of learning are variously addressed in learning theories. Behaviorism and some parts of cognitive science (e.g., the ACT theory of John Anderson and his colleagues) explore the conditions and processes through which skills become habituated through repetitive practice. Psychological constructivist theories stemming from Piaget’s genetic epistemology describe how conceptual structures come to be restructured and strengthened through perturbations that arise from discordant experiences. Sociocultural, situated cognition, and social constructivist theories examine how cultural dispositions are appropriated through cultural participation.

The current interest in enculturationist theory and practice is evident throughout the educational literature. The mathematics education reform documents display an especially strong interest in enculturation/participation. If we take, as do I, modes of thinking (as distinct from specific conceptual understandings) to be enculturated dispositions, the NCTM's (1991) objectives that students come to "explore, conjecture, reason logically; to solve non-routine problems; to communicate about and through mathematics ... [as well as] personal self-confidence and a disposition to seek, evaluate, and use quantitative and spatial information in solving problems and in making decisions" (p. 1) all reflect an enculturationist learning agenda.

Given the burgeoning educational interest in enculturation, and in the sociocultural, situated cognition, and social constructivist theories of learning that address it, "neglected" might seem to be the last adjective to apply to this learning metaphor. However, none of the theories that pursue enculturation do so unifocally. For instance, Lave (1988) "in dialectic spirit" describes how for situated cognition theory the "units of analysis, though traditionally elaborated separately [for social and individual cognitive theories], must be defined together and consistently" (p. 146). Similarly, although Vygotsky (and the ensuing sociocultural tradition) gives clear priority to the *intermental* (social) plane (Wertsch, 1985),

Sociocultural processes on the one hand and individual functioning on the other [exist] in a dynamic, irreducible tension rather than a static notion of social determination. A sociocultural approach ... considers these poles of sociocultural processes and individual functioning as interacting moments in human action, rather than as static processes that exist in isolation from one another. (Penuel & Wertsch, 1995, p. 84)

This dialectic orientation for enculturation-oriented theories can be contrasted with the unifocal character of behaviorism, cognitive psychology, and (psychological) constructivism that study the individual constitution of learning. For instance, Greeno (1997) describes the “*factoring assumption*” of cognitive science: “we can analyze properties of cognitive processes and structures [independently] and treat the properties of other systems [e.g., social systems] as contexts in which those processes and structures function” (p. 6)—a characterization Anderson, Reder, and Simon (1997) readily accept. Similarly, constructivism, in its Piagetian origins and its initial radical variation in mathematics education, examined conceptual structures from a unifocal individualist perspective:

Von Glasersfeld acknowledges a significant debt to Piaget, which may explain why he focuses on the individual knower, and pays scant attention to the social processes in knowledge construction. (Von Glasersfeld’s ... educational concerns of course lead him to address the role of the teacher. But he faces severe problems of consistency here: It is clear that in much of his writing von Glasersfeld problematizes the notion of a “reality” external to the cognitive apparatus of the individual knower/learner. But as a result, it is difficult to see how he can consistently allow that social influences exist....) (Phillips, 1995, p. 8)

Within the rich mix of psychological theories that ground our pedagogical discourse, my concern is that the multifocal theorizations of enculturation index the second class status of this learning metaphor in teaching. Consider, for example, the behaviorist, cognitive, and situative rubrics offered by Greeno, Collins, and Resnick (1996) in their overview of learning theory and education. Whereas the first two are unifocal in their pedagogical orientation, the situative approach to education is integrative: “Sequences of learning activities can be organized with attention to students’ progress in a variety of practices of learning, reasoning, cooperation, and communication, as well as to the

subject matter contents that should be covered” (p. 28). Enculturating students toward modes of engagement (e.g., “practices of learning, reasoning, cooperation, and communication”) is never addressed educationally as a bona fide pedagogical focus in its own right, but is discussed only in conjunction with the (predominating) interests in developing students’ skills and concepts.

This concern needs to be couched within the *crossdisciplinary perspective* (Kirshner, 2000, 2002) that frames the current analysis. Crossdisciplinarity offers a broad critique of the integrative tendency of our pedagogical discourse in which “good teaching” functions as a unitary construct. The basis for this concern is the simple observation that psychological theory has not yet succeeded in establishing a paradigmatic consensus about learning. Rather, in its current *preparadigmatic* state (Kuhn, 1970), multiple notions of learning compete with one another for paradigmatic hegemony. Because “good teaching” is teaching that supports learning, until a consensus about learning is achieved we need to be suspicious of any formulation of good teaching that claims to generality. For although integrative theorizations are offered in the situated cognition, sociocultural, and social constructivist camps, none has yet succeeded in establishing more than a toehold in the broader theoretical spectrum, and each pays a heavy price in clarity and accessibility for taking on the dialectic challenge of bridging across independently sensible metaphors for learning (e.g., Kirshner & Whitson, 1998; Lerman, 1996).

The crossdisciplinary alternative is to articulate discrete theory-based models of good teaching for the discrete learning metaphors. This process requires that each of the three metaphors be independently interrogated as to its implications for teaching, leaving to teachers the values decisions as to which notion(s) of learning to pursue with their students, as well as the tactical problems of coordination and balance in case more than a single metaphor is aspired to. Thus from a crossdisciplinary perspective, enculturation cannot remain in the shadow of other metaphors, but must

step into the limelight as a bona fide pedagogical agenda in its own right. This is the task of the present paper, a task made considerably more difficult by the fact that unifocal theorizations of enculturation processes are not available.

Enculturation as a Metaphor for Learning

I define enculturation as the process of acquiring cultural dispositions through enmeshment in a cultural community (Kirshner, 2002). I interpret dispositions broadly as inclinations to engage with people, problems, artifacts, or oneself in culturally particular ways. Thus establishing an enculturationist teaching agenda requires identifying a reference culture and target dispositions within it. In mathematics education, the reference culture usually is presumed to be mathematical culture, wherein a wide range of distinctive dispositional characteristics has been identified as instructional objectives. These include mathematical proof, the characteristic mode of argumentation by which new knowledge is established for the community through logical (rather than empirical) considerations (Lampert, 1990); a single-minded tenacity in grappling with non-routine problems (Schoenfeld, 1994), together with highly specialized heuristic approaches to solving such problems (Polya, 1957); an aesthetic appreciation of the “mathematically elegant” solution (Yackel & Cobb, 1996); a recognition of the instrumentality of notations and the arbitrariness of definitions within axiomatic systems (Arcavi, 1994); and a propensity for posing problems, rather than just solving them (Brown & Walters, 1990). (See, also, Cuoco, Goldenberg, & Mark, 1995, for a list of “habits of mind” specific to the various mathematical subbranches.)

Lacking a foundation for enculturationist learning in unifocal learning theory, I turn to social psychology for insight and inspiration to inform pedagogical methods. (Ironically, social psychology functions more as a branch of sociology than of psychology. Social psychologists tend to focus on

the effects and distribution of enculturated learning, rather than the psychological processes subserving it.) A paradigmatic example of enculturation is explored by social psychologists under the rubric of proxemics (Hall, 1966; Li, 2001). Proxemics, or personal space, is the tendency for members of different national cultures to draw differing perimeters around their physical bodies for various social purposes. Thus, natives of France tend to prefer closer physical proximity for conversation than do Americans (Reiland, Jones, & Brinkman, 1991). I count coming to participate in this cultural norm a particularly pure instance of enculturation because it is accomplished without volitional participation. Generally people within a national culture acquire proxemic dispositions through cultural enmeshment without intending it, and even without awareness of the cultural norm.

This pure form of enculturation is possible in a unitary culture in which only a single dispositional variation is present. However, one also can come to be enculturated into a subculture whose dispositional characteristics are distinctive among a range of other subcultures' (e.g., being a scientist, being a punk rocker). In such instances, inductees often seek to actively acculturate themselves to a subculture, thereby bringing volitional resources to acquiring the subculture's dispositional characteristics. I define *acculturation* as intentionally "fitting in" to a cultural milieu by emulating the cultural dispositions displayed therein. However, this process needs to be understood as supplementary to the more basic unconscious processes of enculturation going on around it all the time. A cultural milieu is constituted of innumerable cultural dispositions, of which only a limited number can be consciously addressed through strategies of acculturation. Note that Vygotsky's (1987) Zone of Proximal Development conceives of learning in acculturationist terms as an active collaboration between student and teacher: "A central feature for the psychological study of instruction is the analysis of the child's potential to raise himself to a higher intellectual level of

development through collaboration to move from what he has to what he does not have through imitation” (p. 210).

Enculturationist and Acculturationist Pedagogies

The enculturation/acculturation distinction points to two pedagogical strategies that can be discerned in the education literature. (Here, regretfully, I make a terminological distinction between enculturation as a *learning process* that may [or may not] include an acculturationist component and enculturation as a *pedagogical method* conceived of as distinct from acculturationist pedagogy.)

Enculturationist Pedagogy: In any teaching that aims toward students’ enculturation, the teacher begins by identifying a reference culture and target disposition(s) within that culture. In enculturationist pedagogy, the instructional focus is on the classroom microculture. The enculturationist teacher works to shape the microculture so that it comes to more closely resemble the reference culture with respect to the target dispositions. Students, thus, come to acquire approximations of the target dispositions of the reference cultural through their enmeshment in the surrogate culture of the classroom. Yackel and Cobb (1996) most clearly articulate an enculturationist pedagogical agenda in their discussion of *sociomathematical norms* as the targeted dispositions of mathematical culture (e.g., the preference for mathematically elegant solutions) that come to be “interactively constituted by each classroom community” (p. 475).

Enculturationist pedagogy presents the teacher with an obvious “chicken and egg” problem. Students can acquire the target dispositions only to the extent that these dispositional characteristics already are constituted within the classroom microculture. However, in order for the classroom culture to embody these dispositional norms, (at least some) students must already manifest them in

their interactional repertoire within the classroom. Yackel and Cobb (1996) borrow the construct of “reflexivity” from ethnomethodology (Leiter, 1980; Mehan & Wood, 1975) to elucidate the problem:

With regard to sociomathematical norms, what becomes mathematically normative in a classroom [i.e., the corporate dispositions of the classroom microculture] is constrained by the current goals, beliefs, suppositions, and assumptions [i.e., the individual dispositions] of the classroom participants. At the same time these goals and largely implicit understandings [the individual dispositions] are themselves influenced by what is legitimized as acceptable mathematical activity [the corporate dispositions of the classroom microculture]. It is in this sense that we say sociomathematical norms [the target dispositions of mathematical culture] and goals and beliefs about mathematical activity and learning [the currently manifest dispositions of individual students] are reflexively related. (p. 460)

(In their theoretical perspective, Cobb and Yackel, 1996, mark a terminological distinction between individual and social perspectives that I find unnecessary for a crossdisciplinary approach, hence the explanatory bracketed insertions.)

The solution to this problem constitutes the critical expertise of the enculturationist teacher. As Yackel and Cobb (1996) illustrate, through subtleties of attention and encouragement the teacher, over time, can come to exert considerable influence on the modes of engagement manifested within the classroom microculture. It is through patient and directed encouragement that targeted modes of engagement, initially arising within the classroom microculture by happenstance, gradually come to be normative. In this way, for example, argumentation usually based on deference to authority or on empirical generalization can progress toward the norms of logicity favored by mathematical culture.

In nurturing a more sophisticated classroom microculture, the enculturationist teacher is not limited to the (relatively passive) tools of encouragement. As members of their classroom communities, teachers can introduce modes of engagement through their own participation. What is crucial, however, in enculturationist pedagogy is that it is participation in the culture of the classroom—rather than emulation of the teacher as a solitary individual—that continues to serve as the engine for students’ acquisition of dispositional characteristics. To be effective, the teacher him- or herself must be significantly knowledgeable about, and enculturated to, the reference culture. However, once the modes of engagement introduced or supported by the teacher come to *signify* as mathematical, this affords students who are mathematically identified the opportunity to bypass the surrogate microculture of the classroom and connect directly with the authentic culture of mathematics as manifest in their engagement with the teacher. In this case, the teaching role is significantly altered as we leave the realm of enculturationist pedagogy and verge into the acculturationist terrain with all the attendant complexities of personal identity.

Acculturationist Pedagogy: I open this section with a brief anecdote. I recently had the opportunity to co-teach a senior level university mathematics course with two mathematics colleagues. The purpose of the course was to help students understand, appreciate, and participate more fully in mathematical culture. My colleagues, both senior members of a highly ranked mathematics department, were accustomed to, and successful in, the mentoring of doctoral students. The approach they took in our course involved assigning the students problems, discussing the problems with them, and in the process modeling their own (unprescribed) solution approaches, following fascinating tangents arising from the original problem, communicating their broad perspectives on mathematics, and sharing their excitement and passion for the field. I presume these

are methods they would typically employ, with good effect, with their graduate students—students already self-identified as mathematicians. However, the undergraduate students in the course—though seniors—generally were unable to appreciate or make use of the rich cultural resources offered by the instructors.

This cautionary tale serves as an introduction to acculturationist pedagogy, a pedagogical method that builds on (or supports) students' identification with the reference culture. The acculturationist teacher is first and foremost a representative of the reference culture. The primary pedagogical activity is modeling dispositional characteristics of the culture. It is left to the students to appropriate these cultural resources and incorporate them into their evolving repertoire based on their own acculturationist goals. Or acculturationist pedagogies may seek to encourage cultural identification, as in Brown and Campione's (1996) strategy of positioning students as experts on a particular scientific topic and involving them in email collaboration with actual scientists. The concern in the situated cognition literature for "authentic activity" (Brown, Collins, & Duguid, 1989, p. 34) and "legitimate peripheral participation" (Lave & Wenger, 1991) are indicative of the acculturationist bent of that pedagogical movement.

In practice, the distinction between enculturation and acculturation pedagogies can be subtle. In his classic volume, mathematician George Polya (1957) described his pedagogical role in modeling the self-questioning strategies that undergird successful problem solving in mathematics. However, he was careful to emphasize the need to be unobtrusive and natural in supporting the students' own efforts with ongoing problems: "The teacher should put himself in the student's place, he should see the student's case, he should try to understand what is going on in the student's mind, and ask a question or indicate a step that *could have occurred to the student himself*" (p. 1). In this respect,

Polya demonstrated an enculturationist concern for the evolving microculture of the classroom problem solving situation rather than an acculturationist appeal to the mathematical self-identity of the student.

There are some circumstances, such as graduate education or after school math clubs, in which acculturationist approaches seem clearly appropriate. Other circumstances, such as that described in the above anecdote, clearly are unsuitable. Those mathematics seniors needed an enculturationist pedagogical approach in which the forms of participation were interactively constituted, rather than just demonstrated or modeled. (I believe mathematics has a more pronounced problem than other subject areas in the lack of disciplinary enculturation generally achieved by undergraduates.) However, the extant pedagogical literature concerned with students' enculturation (e.g., articles cited herein) includes, without distinction, reference to both enculturationist and acculturationist techniques. This practice flirts with a variety of potential problems that will need to be addressed before enculturationist learning goals can achieve the status they deserve in education:

- Are acculturationist and enculturationist pedagogies inherently in tension with one another? Does the personal self-identification of some students with the teacher as a representative of the reference culture subvert the work of establishing a classroom microculture that serves all students; or can a skillful teacher use the acculturationist gains of the few to support and strengthen the classroom microculture for the many?
- Are there social chasms that emerge in a classroom in which the teacher reciprocally supports the identity construction of a few students? How do such chasms interact with divisions of race, class, and gender already present in the classroom? More generally, are there ethical considerations that arise in general education when a teacher places expectations of a

particular cultural identification on students? If so, are such concerns outweighed by the importance for all students to have opportunities for identification with disciplinary cultures?

- Are (teacher-centered) acculturationist practices in which the teacher embodies cultural dispositions used to substitute for the delicate and difficult (student-centered) work of nurturing those dispositions within the evolving classroom microculture? (The analogy, here, is to lecture, understood within crossdisciplinarity as a teacher-centered approach to students' conceptual development that relies on students' metacognitive sophistication to bring dissonant understandings into productive contact with one another. Otherwise, the student-centered constructivist teacher must take on the responsibility for orchestrating cognitive dissonances through carefully contrived task experiences.)

The enculturationist/acculturationist distinction introduced here previously is unnoted in the literature. As a result, the possibility for a pure enculturationist pedagogy and the potential problems of blending enculturation with acculturation pedagogies have not been addressed. I count it a strength of the crossdisciplinary approach that unifocal attention to the learning metaphors brings forth such distinctions, with all of their attendant possibilities and problems.

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