

Pedagogical Praxis: Using technology to build professional communities of practice

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New technologies make it possible for young people to participate more directly in the world of adult activities, whether using software tools to develop new mathematical proofs (Lichtfield, Goldenheim, & Dietrich, 1997), participating in the collection and analysis of real scientific data (Evans, Abrams, & Rock, 2001), or publishing work on the Internet. Thus, new technologies make it easier for students to learn about the world by participating in meaningful activity. This idea is not new; rather, it explains one way that new technologies support Dewey's vision of bringing the "life of the child" into an environment for learning (Dewey, 1915, p. 30).

Dewey argued that knowing and doing are tightly coupled, and thus learning needs to take place in the context of activity (Dewey, 1915; Menand, 2001). Moreover, as Dewey suggested in *Art as Experience* (1958), learning involves meeting and overcoming obstacles in the process of trying to accomplish a meaningful goal. "Resistance and check," he wrote, "bring about the conversion of direct forward action into re-flection [*sic*]" (p. 60). Schon argues that professionals enact this link between knowing and doing through a process of reflection-in-action: literally, "a capacity to combine reflection and action, on the spot, . . . to examine understandings and appreciations while the train is running" (Schon, 1985, p. 27). Schon's work suggests that professionals learn to think in action, and that they learn to do so *through* their professional experiences. Reflective practice involves taking action and then reflecting on the results with peers and mentors.

As Vygotsky and other theorists have suggested, this reflective process is progressively internalized: the norms, habits, expectations, abilities, and understandings of a community of practice—the ways of thinking and acting of the community—become part of the identity of the individual (Gee, 1992; Lave, 1991; Lave & Wenger, 1991; Vygotsky, 1934, 1978; Wenger, 1998; Wertsch, 1998). Lave and Wegner describe a community of practice as a group of individuals who share a repertoire of knowledge about and ways of addressing similar (often shared) problems and purposes. In the process of participating in the learning practices of such communities, individuals develop ways of thinking and reframe their identities and interests in relation to the community. For example, journalists share common ways of thinking and working, and individuals who work in the field of journalism incorporate these ways of thinking and working into their sense of self, coming to think of themselves, at least in part, as journalists.

Different communities of practice (for example, different professions) have different epistemologies: different ways of knowing, of deciding what is worth knowing, and of adding to the collective body of knowledge and understanding. In the context of professional activities, these ways of knowing are constituted in practice, and the processes of professional training are designed to link praxis and epistemology through pedagogical activity. Pedagogical praxis thus takes a *learning practices perspective* (Hall & Stevens, 1996; Schwartz & Sherin, 2002), using the ways in which professionals are trained as a model for learning environments. This is in contrast to approaches that develop learning environments based on the activity structures of experts in professional practice in real world contexts (Dewey, 1915; Greeno, 1997; Hmelo, Holton, & Kolodner, 2000; Kolodner, Crismond, Gray, Holbrook, & Puntambekar, 1998; Lave, 1991; Lave & Wenger, 1991).

The challenges in educational design from the perspective of professional learning practices are three-fold. First, one must uncover the structure of learning practices as they are currently constituted: the relationships among activity, pedagogy, and epistemology that different learning practices embody. Second, one has to map the relationships between the epistemologies of practice and the kinds of understanding (cognitive, social, moral, and practical) that we want young people to develop in the course of their education. And third, we have to develop techniques for adapting extant learning practices to create environments that are true both to the ways of knowing of those practices and to the central skills, habits, and understandings that young people need to incorporate given their developmental trajectory. That is, we need to know how professional learning practices work, how they relate to what young people need to learn, and how to use technology to bring those practices within young people's grasp.

Environments that develop constructive skills, habits, and associations function as coherent systems (Brown & Campione, 1996; Papert, 1980; Shaffer, 2002). Any successful implementation of a context for learning depends on a clear articulation not only of "surface procedures," but also of the underlying "principles of learning" (Brown & Campione, 1996, p. 291). One approach to creating such coherence, explored by many designers of thoughtfully innovative learning environments, is to articulate a set of principles that will guide the design of activities and assessments (Bransford, 1994; Brown & Campione, 1996; Enyedy, Vahey, & Gifford, 1997; Goldenberg, 1996; Goldman-Segall, 1997; Hmelo et al., 2000; Jackson, Stratford, Krajcik, & Soloway, 1996; Jacobson & Lehrer, 2000; Kafai, 1996; Kolodner et al., 1998; Resnick, 1994; Scardamalia & Bereiter, 1996). A challenge in this approach is that the number of principles and practical constraints multiplies quickly. Designing an environment that simultaneously addresses a complex system of requirements can be daunting.

Pedagogical praxis takes a different approach. Because professional learning practices have evolved into coherent systems over time, pedagogical praxis suggests that professions such as accounting, architecture, mediation, engineering, journalism, law, and medicine can provide particularly powerful models for developing technology-based learning environments in which young people can learn important skills, habits, and associations (Shaffer, 1998, 2002). The model of pedagogical praxis is to uncover the principles embedded in existing learning practices (a problem of cognitive anthropology and descriptive ethnography), develop technologies to help students participate in these practices (a problem of engineering and technology development), and then create experimental learning environments designed to develop life skills through participation in a community of practice (a problem of program design and action research).

In so doing, pedagogical praxis seeks to create environments that are *thickly authentic*. Resnick and I (Shaffer & Resnick, 1999) have argued that authenticity is an alignment between activities and some combination of (a) goals that matter to the community outside of the classroom, (b) goals that are personally meaningful to the student, (c) ways of thinking within an established domain, and (d) the means of assessment. Thickly authentic learning environments create all of these alignments simultaneously—for example, in the case of pedagogical praxis, when personally meaningful projects are produced and assessed according to the epistemological and procedural norms of an external community of practice.

In this vision, new technology reinvigorates Dewey's (1915) idea of learning important life skills through active engagement in meaningful activity. Young people learn by working as “practicing” professionals (Schon, 1985, 1987; Shaffer, 1998, 2000, 2002).

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