

Still, for Joe the shop floor provided what school did not; it was *like schooling*, he said, a place where *you're constantly learning*. Joe learned the most efficient way to use his body by acquiring a set of routines that were quick and preserved energy. Otherwise he would never have survived on the line.

As a foreman, Joe constantly faced new problems and became a consummate multi-tasker, evaluating a flurry of demands quickly, parceling out physical and mental resources, keeping a number of ongoing events in his mind, returning to whatever task had been interrupted, and maintaining a cool head under the pressure of grueling production schedules. In the midst of all this, Joe learned more and more about the auto industry, the technological and social dynamics of the shop floor, the machinery and production processes, and the basics of paint chemistry and of plating and baking. With further promotions, he not only solved problems but also began to find problems to solve: Joe initiated the redesign of the nozzle on a paint sprayer, thereby eliminating costly and unhealthy overspray. And he found a way to reduce energy costs on the baking ovens without affecting the quality of the paint. He lacked formal knowledge of how the machines under his supervision worked, but he had direct experience with them, hands-on knowledge, and was savvy about their quirks and operational capabilities. He could experiment with them.

In addition, Joe learned about budgets and management. Coming off the line as he did, he had a perspective of workers' needs and management's demands, and this led him to think of ways to improve efficiency on the line while relieving some of the stress on the assemblers. He had each worker in a unit learn his or her co-workers' jobs so they could rotate across stations to relieve some of the monotony. He believed that rotation would allow assemblers to get longer and more frequent breaks. It was an easy sell to the people on the line. The union, however, had to approve any modification in job duties, and the managers were wary of the change. Joe had to argue his case on a number of fronts, providing him a kind of rhetorical education.

Eight years ago I began a study of the thought processes involved in work like that of my mother and uncle. I catalogued the cognitive demands of a range of blue-collar and service jobs, from waitressing and hair styling to plumbing and welding. To gain a sense of how knowledge and skill develop, I observed experts as well as novices. From the details of this close examination, I tried to fashion what I called "cognitive biographies" of blue-collar workers. Biographical accounts of the lives of scientists, lawyers, entrepreneurs, and other professionals are rich with detail about the intellectual dimension of their work. But the life stories of working-class people are few and are typically accounts of hardship and courage or the achievements wrought by hard work.

Our culture—in Cartesian fashion—separates the body from the mind, so that, for example, we assume that the use of a tool does not involve abstraction. We reinforce this notion by defining intelligence solely on grades in school and numbers on IQ tests. And we employ social biases pertaining to a person's place on the occupational ladder. The distinctions among blue, pink, and white collars carry with them attributions of character, motivation, and intelligence. Although we rightly acknowledge and amply compensate the play of mind in white-collar and professional work, we diminish or erase it in considerations about other endeavors—physical and service work particularly. We also often ignore the experience of everyday work in administrative deliberations and policymaking.

But here's what we find when we get in close. The plumber seeking leverage in order to work in tight quarters and the hair stylist adroitly handling scissors and comb manage their bodies strategically. Though work-related actions become routine with experience, they were learned at some point through observation, trial and error, and, often, physical or verbal assistance from a co-worker or trainer. I've frequently observed novices talking to themselves as they take on a task, or shaking their head or hand as if to erase an attempt before trying again. In fact, our traditional notions of routine performance could keep us from appreciating the many instances within routine where quick decisions