FIVE PERSPECTIVES ON TEACHING IN ADULT AND HIGHER EDUCATION

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CHAPTER 5

THE APPRENTICESHIP PERSPECTIVE

Modelling Ways of Being

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While the transmission perspective may seem overwhelmingly familiar in education, by contrast, the Apprenticeship Perspective is so common outside formal education that it is nearly invisible as a way to explicitly teach and learn (Coy, 1989). When it is used explicitly in teaching, it is applied most often in the traditional sense—to teach procedures (tying a shoe, building a fire, taking blood). But it is also increasingly used in "intellectual apprenticeships" to develop master practitioners in disciplines and practices characterized by great complexity, multiple procedures, and dynamic environments (such as medicine, police work, and professional development).

Unfortunately, because this presentation about the Apprenticeship Perspective must necessarily use a book, this chapter has to violate the core tenet of apprenticeship: it must "tell you about" rather than "involve you within" an actual, physical context of practice. Try to bear this in mind as you find yourself reflecting on discussions here; unfortunately you will be attempting to grasp the difference between this perspective and the last while subject to a technology which favors transmission!

In order to explain the Apprenticeship Perspective from this rather ironic vantage point, two conceptual understandings are fundamental. First, it's crucial to identify how learning itself is understood within this perspective. How is learning created, developed, and manifested? Second, it's important to detail characteristics of actual practice. What are the

noteworthy aspects of "mastery" in real contexts of practice? (Master is used here in a gender neutral sense, referring to a person who has acquired a thorough knowledge and skill in a particular area of practice.) Once you have a mental picture of these two conceptual foundations, it's useful to illustrate them in an example. In the first example, we hope the context is authentic and familiar enough to somewhat "pierce" the medium of text and engage you in a bit more visceral, and less abstract, understanding of apprenticeship.

However, to complete an understanding of this perspective, it is also important to trace a second example, of an intellectual rather than traditional apprenticeship. The context of this second example, as it is likely less familiar to you, will require a bit more theoretical discussion comparing the types of apprenticeships. The chapter will end with a summary of the key points about this perspective.

UNDERSTANDING LEARNING FROM AN APPRENTICESHIP PERSPECTIVE

Learning As Changing Schemas

When we enter a new world, whether traveling to a foreign country, or starting a new job, we are confronted with a buzzing, confusing environment filled with new and shifting patterns that don't make sense to us. To deal with our initial confusion we often impose our familiar world upon the new, and in doing so, misinterpret or oversimplify the situation.

For example, imagine a group of tourists that have just returned from 3 weeks of touring China. They were very likely shuttled about in an air-conditioned bus, ensconsed in luxury hotels, taken to see the usual tourist attractions, and shown how China is making huge strides in the Four Modernizations, particularly on the economic front. From these experiences our imaginary tourists might have a very simple, romanticized picture of that complex country and its people. If this is their first visit, their understanding of China will likely not only be simplistic and romanticized, but interpreted through the ways in which they live their own lives. They will have placed a template of their own life over the landscape and people of China and from this extracted patterns and meanings that will form the basis for many stories about China. As they tell their stories over and over, their picture of China will become reified,

that is, fixed and, consequently, resistant to change. The next time they return to China, or are confronted with a new experience about China, this simplified characterization will frame their understanding.

If they subsequently spend time in China, experiencing the people and the culture from a vantage point not framed by the tourist map, they would, very likely, gradually find new meanings and discover complex patterns that challenged their prior understanding. Eventually, they may even think differently about their own culture and identity. The same process occurs whether encountering a new city, strange customs, or a complicated set of procedures; once we find new patterns, our thinking changes fundamentally.

But what has changed? Cognitive psychologists say our *schemas* have changed, that is, the cognitive maps we build that help us organize and interpret the world. Schemas are the forms in which we summarize our general knowledge, beliefs, attitudes, and experience about people, places, events, objects, and ideas. When entering a new experience, or encountering a new piece of equipment, we project our existing schemas on the new situation, framing and interpreting it according to what we already know. We then use our schemas as mini-theories to predict how we should react in the new the situation.

Initially, we develop simple maps or schemas. Like a child's early drawings, our schemas are oversimplified and contain only the bare essentials. Indeed, they must be simple if we are to cope with the whirling complexity of most novel situations. Yet, as we gain experience our representations or schemas of the situation become more elaborate and more connected to other schemas in our heads. When this happens, our personal theories expand and increase our ability to handle related problems and situations with greater confidence.

Simplistic, individual schemas are like molecules that combine to form larger understandings. For example, a child may have an initial schema about food preparation that begins with simply making sandwiches for friends. As the child grows, and gains experience working alongside a parent, that schema may expand to include more people and a greater variety of food. Eventually, his or her knowledge of food preparation may include more complex schemas that require following recipes and even adjusting recipes to different size groups. Perhaps over time that knowledge of food preparation would develop into a larger schema of catering and involve much more complex coordination of special events, budgeting, settings, and even additional employees. As the person's

knowledge of food preparation reached a further level of sophistication, he or she would have many related and complex schemas, each dependent on the others for their meaning and utility in the preparation of food.

Thus, schemas are the building blocks of our understanding. We start with simple schemas, gradually expanding, revising, and linking them with other schemas. With each use, the organization and the content of schemas evolves as we build more complex representations of our work, our relationships, and our knowledge of the world around us. Inevitably, through more and more experience, the process of elaborating, revising, and integrating schemas leads to more developed bodies of knowledge and expertise. Eventually, we have a complexly woven web of information and beliefs that guide our thinking and actions in a particular domain of practice or expertise.

It stands to reason, therefore, that a person with more experience, particularly if they critically reflect on that experience, would have a more complex, elaborate, and comprehensive set of schema than a novice (Brown et al., 1989; Sherman et al., 1987). For everyone, though, according to the psychologists, having schemas is fundamental. Rumelhart (1980, p. 37) puts it succintly:

> [schemas are] a kind of informal, private, unarticulated theory about the nature of events, objects, or situations that we face. The total set of schema[s] we have available for interpreting our world in a sense constitutes our private theory of the nature of reality.

Individual schemas, then, provide us with the first insight into how learning is understood within this perspective. However, an essential component of the Apprenticeship Perspective is the social and relational contexts within which schemas are constructed. Within the Apprenticeship Perspective, learning is understood as a blend of both a product and a process. The product is a change in the quality of our understanding or schemas. The process is the testing, building, revising, and integrating of schemas within contexts of application; the schema we take away from a learning episode, that is, our comprehension of something, is dependent upon the context within which we learned it. It is as if the new schema is textured, or given added meaning and significance, by the the social circumstances within which it was learned. This is highly significant for effective education. The transfer of learning (i.e., the application of schemas in circumstances outside the classroom) is a serious problem for much of higher education. It isn't that learners don't comprehend

what they study, but rather that their learning is incomplete; it is not textured or indexed with the nuances, complexities, and relationships that are a part of situations of application.

Within this perspective there is no separation of the process and the product. What is learned is intimately linked to where, when, how, and with whom it is learned. Thus, context and content, process and product, interact to form the concept of "situated learning."

Situated Learning

Although the phrase sounds new, the idea is not. Traditional apprenticeships have been based on this notion of learning in situations of application for centuries. Recently, the idea has been expanded to give us new insights into old problems, such as why people who fail high school math are able to calculate price savings and best-buy bargains at the grocery store, or why medical students who receive good grades on basic sciences must re-learn that same content for application in clinical settings, or why, as mentioned earlier, a woman with a third degree black belt in karate was unable to defend herself against rape.

Situated learning moves our focus from schemas (inside the heads of individuals) to the social contexts of participation and learning which are rich and complex with meaning. Within situated learning there is a reciprocity between individuals and social groups. Learners do build, revise, and integrate their schemas related to the tasks and relations of their work or communities; but, simultaneously, the community of people also changes. The knowledge, skills, and network of relationships being learned change as each learner leaves behind the yoke of apprenticeship and moves toward becoming a master practitioner; and, eventually, the very nature of a profession's work, or a family's traditions, or the larger community changes. Thus, a central idea embedded in situated learning is that the product of learning cannot be reduced to cognitive structures (schemas), but must acknowledge the larger changes in the social order and work of a community. As Hanks said in his introduction to Lave and Wenger's book (1991):

> The challenge, it would seem, is to rethink action in such a way that structure and process, mental representation and skillful execution, interpenetrate one another profoundly . . . The activity of understanding, in such a view, comes down to recognizing and implementing instances of structure, filling them in with an overlay of

> situational particulars, and relating them to a "context" (which is in turn structured). [Learning is located] not in the acquisition of structure, but in the increased access of learners to participating roles in expert performances. (pp. 16–17)

Thus, schemas that result from situated learning are more than simple maps of a terrain or body of knowledge. They are richly textured webs of meaning that involve role, relationship, and legitimate participation in a community's work. The ultimate product of situated learning is knowledge that is embedded in, rather than extracted from, contexts of its application. It is, very often, knowledge that is hidden from view, or tacit, but absolutely key to intelligent action. It is the knowledge one needs to succeed. Unfortunately, it is very often the knowledge that is not explicitly taught, but essential to becoming a skillful practitioner.

However, as Sternberg and Horvath (1995) point out, tacit knowledge is crucial to understanding expertise as it develops and as it operates in contexts of application and practice.

> Research has shown that tacit knowledge generally (a) increases with experience on the job, (b) is unrelated to IQ, (c) predicts job performance better than does IQ, (d) provides a significant increment in prediction above that provided by traditional tests of intelligence, personality, and cognitive style, and (e) overlaps across field, though only partially. In a typical test of tacit knowledge, subjects are given a scenario relating to a situation they might encounter on the job and are asked to rate the quality of different courses of action as responses to the situation. Every study in this [their own] program of research—investigating the tacit knowledge of business executives, professors of psychology, sales people, and college students—has shown that tacit knowledge is important to expertise on the job. (p. 12)

Thus, a most important outcome in situated learning is tacit knowledge that results in a skillful practitioner. Skillful practitioners have an extensive body of organized and relevant content knowledge that is readily accessible; they are able to take on a variety of roles, anticipate what is feasibly going to occur within specific realms of practice, are able to function effectively in ways that go beyond present schemas, and are able to improvise new schemas based on changing circumstances. Much of that cannot be learned outside contexts of practice. None of that can be learned solely in classrooms. So, how is it learned?

Legitimate Peripheral Participation

This process of acquiring knowledge in the setting where it is applied comes about through a process called legitimate peripheral participation (Lave & Wenger, 1991). In this process, novices enter a community of practice (a workplace, institution, or association), and work alongside more seasoned practitioners, within roles which gradually become more complex; in this way, they acquire situated knowledge. According to Lave and Wenger (1991), this is a natural outcome to peripheral participation; through a process of absorbing, contributing, and reflecting, a novice gradually assumes (or is given) more legitimate influence and responsibility within the workplace or community. Their schemas, and their legitimate experience become of increasing value and trustworthiness in the larger situation of practice.

There are three key factors which aid in successful learning and progression toward mastery. Such a process must be *active*, not passive, *social*, cooperative, collaborative; and *authentic*, enculturated (Brown et al., 1989). Let's consider each of these aspects in turn.

How many of us have some kind of tool in our basements, workshops, sewing rooms, or gardening sheds that we cannot use? Perhaps we saw it advertised, and thought "Wow, that would be a good tool," and yet, when we got it home and tried it, it didn't quite work the way we thought it should. So there it sits, a mute reminder to us of something that might be useful, if we could ever figure out what to do with it. Yet, perhaps what we need to do is simply try using it again, or talk about it with others, or re-evaluate its original purpose. Often, the second or third time we use a tool its function becomes easier to grasp, because our understanding of the tool and the world in which we are using that tool grows, through our active investigations of it. In other words, our internal schemas may have developed, or our experience may have deepened, or, most likely, both have occurred. This is true not only for shiny metal objects in the workshop, but also for concepts that function as ideational tools (e.g., computer training in kindergarten, or block parent programs).

Social interactions also, obviously, affect our internal schemas about tools, but can also lead to a more refined understanding about the appropriate use of, and even the meaning of, particular tools. Thus, two professional communities may use an apparently similar tool, but the social process of negotiating distinct meaning and appropriate use of that tool will ultimately determine its application. For example, both teachers and

counselors act as facilitators, but the meaning of their actions and the uses they have for the tool of facilitation differ noticeably.

Finally, the necessity for successful learning to involve authentic content and process means that they must reflect what ordinarily occurs within the culture—the accepted practices and customs of members of the community (Brown et al., 1989). Members of any culture, or community of practitioners, are connected by the tasks that they do and the beliefs that they hold (Geertz, 1983). The ordinary practices of a community are those that are socially constructed through negotiation among past and present members. They are therefore coherent, meaningful, and purposeful to those members, although they may not be so to nonmembers. For example, some orchardists thin their fruit, others do not. Yet all orchardists understand the purpose behind thinning. Nonorchardists often do not.

In sum, novices enter situations of practice, and engage in active, social, and authentic participation. As a result, they gradually acquire identities and perform in roles which are regarded as valuable and essential to the practice. For instance, over time, a medical student ceases to be only a medical student; she becomes a skilled interviewer, a lab technician, an assistant at surgery, etc. We know that this is accomplished through working alongside more experienced practitioners and peers, but what are other aspects of how this process works?

First, the authentic practice itself creates the curriculum for novices. Because legitimate peripheral participants have access to and can observe all aspects of practice, they develop a broad and evolving view of what constitutes the practice, how community members interact, and what there is to be learned. The "curriculum" unfolds as opportunities develop for learners to become engaged in practice, as for example, the way in which new university teachers have the opportunity to teach different classes to different groups of students at different levels of mastery.

Second, for novices to become full members of a community of practice, they require access to a wide range of activities, and to members of the community with differing levels of expertise. They also need access to information, technology, resources, and opportunities for participation. Different communities organize this access in different ways, with varying consequences. The way in which access is organized significantly affects how learners understand the importance and the relationships of the activities, members, and resources within and to the community. For example, bank manager trainees who are only given opportunities to work in a limited number of bank departments will develop a distorted view of the banking community.

Third, in becoming a full member of a community of practice, novices learn how and when to talk, and to be silent, as full participants do. They develop the ability to talk "within" a practice—the discourse of practice—rather than to talk "about" the practice from the outside. Talking within includes both exchanging information necessary to the activities of the practice, and telling stories about problematic and difficult situations of practice in order to aid reflection and decision making, and to signal membership. As novices are accepted by master practitioners, they begin to know that there is a field for their own mature practice. They thus develop a sense of the value of participation to the community and are motivated to learn as a function of their own increasing sense of identity (or identities) as community members.

Finally, as a function of chronology as well as situated practice, within any community of practice, novices ultimately become full participants, replacing those who were the full participants when the novices joined the community. Conflict exists in the ways in which novices and full participants establish and maintain identities, and generate competing viewpoints on the practice and its development over time. Power relations influence these conflicts, which are experienced and resolved through the interplay of differing viewpoints and common stakes within a shared everyday practice. As such, change is a fundamental and inevitable property of communities of practice.

Let us summarize the last few points. Although learning can be described as internalized schemas—which vary both between and within individuals given that they constantly change and evolve—learning is also inherently social and dynamic in nature. The social processes of negotiation, cooperation, and participation fundamentally affect (a) what is considered legitimate learning content, (b) understanding of appropriate use of that content, (c) identities of individual members of a community of practice, and (d) how that community of practice collectively renews itself. Further, successful learning is understood to be active, social, and authentic in nature. Thus, when we think about learning from this perspective, conceptual knowledge (knowing) and problem-framing and -solving skills (doing) are not seen as independent of the situations within which they are to be used. Rather, they are understood to be created and given meaning by the context and activities through which they are learned (Prestine & LeGrand, 1991).

The situation of authentic practice is thus, itself, the domain where learning both occurs and manifests. It changes as novices participate, make mistakes, learn, and contribute on their way to mastery, even as the nature of the practice iteself changes because of new participants and other external influences. In this perspective, true learning cannot occur soley within a classroom or solely by discourse; it demands actual physical engagement within a community. Given that, it's time to look more closely at what characterizes actual practice. What are the realities of situations of practice? What are the discernable traits of master practitioners?

MASTERY IN PRACTICE

Characteristics of Situations of Practice

For many years, educators and professionals have thought of situations of practice as collections of problems to be solved. Moreover, these collections were seen to contain well-defined problems which practitioners simply had to identify and subsequently address with the appropriate solution. Since problems were seen as primarily well defined, this process of identifying and applying solutions was not considered particularly problematic, given that practitioners had adequate conceptual knowledge, or tools.

However, recent studies have revealed that situations of practice are far more frequently ill-defined and problematic, and characterized by vagueness, uncertainty, and disorder (Schon, 1983). These difficult situations often have unique aspects or are unique events, for which there is no standard response. Further, they often include conflicts of values, goals, and interests. For example, in avalanche work, forecasters charged with the responsibility to avert highway avalanche hazards must deal with conflicting pressures to maintain the safety of members of the public, to maintain the safety of maintenance contractor staff, and to minimize interruptions to traffic (and thus the economic and emotional impacts of road closures). As with most situations of practice, it is seldom possible to meet all competing objectives simultaneously. In sum, situations of practice are not straightforward and uncomplicated. They contain few simple solutions, and often involve virtually "first-time" solutions arising from conflicting elements.

Characteristics of Master Practitioners

Master practitioners exist in a huge variety of disciplines, communities, workplaces, and situations. As mentioned earlier, master is used here in a gender neutral sense, to refer to a person who has acquired a thorough knowledge of and/or is especially skilled in a particular area of practice. In an attempt to identify some common characteristics across this diversity, Schon (1983) and Weinstein and Hamman (1994) identified the following criteria:

1. Master practitioners possess great amounts of knowledge in their areas of expertise, and are able to apply that knowledge in difficult practice settings.
2. Master practitioners have well-organized, readily accessible schemas which facilitate the acquisition of new information.
3. Master practitioners have well-developed repertoires of strategies for acquiring new knowledge, integrating and organizing their schemas, and applying their knowledge and skills in a variety of contexts. They are often distinguished by the complexity and sophistication of their schemas. Because they learn and apply their strategies in the contexts of particular practices, they make meaning in their application of these strategies in ways unique to those practices, whether they are university professors, electricians, or native elders.
4. Master practitioners have a mastery orientation to their areas of expertise. They are motivated to learn as part of the process of developing their identities in their communities of practice. They are not motivated to learn simply to reach some external performance goal or reward.
5. Master practitioners frequently display a tacit "knowing-in-practice," a phenomenon with three distinct properties. Masters appear to be able to access actions, recognitions, and judgements spontaneously during their performance of duty. Second, they are often unaware of having learned to do these things, and simply find themselves doing them. And finally, although some masters were once aware and others were never aware of the understandings which were subsequently internalized in "feeling for the stuff of action," all masters are usually unable to describe the knowing which their actions reveal.

Thus, masters not only act from extensive knowledge and elaborately textured schemas, they are also able to adapt successfully to unusual and problematic situations of practice. That is, they can transcend the limits of a single situational context and bring to practice a tacit knowing in new situations. Some of this may be related to how masters remember their knowledge. When it accretes slowly, over multiple applications, it appears that masters remember in an indexed way, which allows for an effective cross-referencing of concepts, data, and situational subtleties.

PUTTING THESE CONCEPTUAL FOUNDATIONS TOGETHER

The realities of situations of practice, added to ideas about learning in this perspective, provide some general insights into what is expected of novices working to develop identities as skilled and knowledgeable practitioners. While doing this, they will often be learning within situations, characterized by complexity, uncertainty, instability, uniqueness, and value conflict. Such situations also have few simple solutions.

Master practitioners are those who possess significant, well-organized and accessible schemas and skills in their areas of expertise. They have well-developed repertoires of strategies for acquiring, integrating and applying their knowledge and skills in practice. They are motivated to develop their knowledge and skills through their participation in, and sense of belonging to, a community of practice. They frequently display a tacit knowing-in-practice—knowledge and understanding of actions which they may not be able to articulate.

Communities of practice come into existence, change, and reproduce themselves through the practice and interrelationships of their members. Conflicts within such communties are negotiated in the context of differing viewpoints, common stakes, and shared everyday experience. Novices are motivated to learn through their increasing participation in the curriculum of the authentic practice itself. The ways in which communities organize access to activities, members, information, technology, resources, and opportunities for participation can enhance or hinder the learning of novices. Eventually, novices' participation results in mastering multiple identities useful to, and valued by, the community, as well as a facility for engaging with the "discourse" of the practice.

As mentioned right at the outset of this chapter, all of us have countless examples of the whole gestalt of the Apprenticeship Perspective, as both teachers and learners. To bring all the foregoing theory and discussion into focus, let's highlight all their elements in two situations of practice—one so enmeshed in daily life as to be nearly invisible as a process, and one in an explictly educational forum. We extend thanks to Adrienne Burk for her help in articulating the first example.

An Everday Example

These days, it's easy to imagine that nearly every child, and certainly virtually every child with urban experience in North America, has some experience with cars. Perhaps it starts as early as the first ride home from the hospital, or across a landscape to the grandparents' house. There is sensation, colour, sound, the beginnings of a schema about movement, and soon, even of a vehicle. Perhaps the child is given a toy car, and, ignorantly leaving it in the dog dish or on the bottom stair, is sternly informed that cars belong on roads, or at least in particular places. The schema spirals up one level of sophistication. Let us suppose the child grows a little, and begins to identify cars in books, in visual media, from sounds on the radio, and even begins to differentiate between Dad's and the neighbor's car.

This child begins to travel as a matter of course—whether by bus, snow- mobile, or Jaguar—and a notion of traffic develops. Mom lets the child insert the car keys; Dad talks through the various ways of watching traffic flow. Perhaps the child rests her hand on the gear lever while a parent shifts, perhaps another cranes his little neck outside the window to help an adult check the curb.

Years pass. Every automotive errand, incident, or accident moderates and elaborates the child's schema about cars, and, via peripheral participation, adds to the child's notions of the situation of practice, e.g., driving a car. The day arrives, and the child decides no longer to be a novice, but a master; she signs up for lessons at a driving school. What happens? Does the instructor take her onto a spaghetti junction of highways at night in the rain?

No. He sits alongside her, in a shut-off car with dual steering wheels and brake systems, and talks to her for several minutes. He talks about assumptions, ground rules, rhythms to driving. He then drives her to a parking lot, a deserted road, the quietest street in town, and

turns off the motor again. He asks her to check her mirrors, adjust her seat, notice the way she is holding the steering wheel. Finally, he asks her turn the key in the ignition, feel the proper level of idle, and drive to that little shed 300 yards ahead, at a specific speed, and stop. What's he doing?

The instructor is beginning by offering the novice a simple, skeletal, conceptual map. The elements in it are authentically weighted (e.g., the dimensions of the real community of practice are acknowledged by the initial talk, as well as the drive through traffic to the practice area), but the novice's first, focused task is easy, and straightforward, and emphasizes successful completion. Such a task serves to increase the novice's sense of confidence, and a sense of actively joining an authentic practice community. She is situated, here, not as an observer, but as a participant.

Gradually, with each lesson, each successful completion of tasks, complexity is added, and the novice's learning becomes textured and remembered in an indexed way within her schema about driving so that it is accessible for increasingly less controlled driving situations. During this time, the instructor parallels, coaches, and protects the novice by operating alongside (and potentially controlling) the driving situations in the event of too much complexity. As the novice increases in mastery, she begins to think of herself less as a "student driver" and more a "driver". She learns the highway code, and passes the driver's test first time.

With practice, and over time, she becomes a commuter. In a few years, maybe she's a trucker, a highway cop, or maybe she's switched to being a motorcyclist or a van driver. A decade after that, she finds herself amazed to be where she never imagined she would be—a teacher sitting alongside her teenage son in a parking lot in an idling car telling him to check his mirrors, adjust his seat, and drive to that little shed 300 yards away, and stop. Our novice has become a master. Now, she effortlessly and unconciously adjusts to changes in weather, to weight and length of rental vehicles, to unfamiliar roads, tight parking spaces, speed limits, and habits of her fellow drivers. She knows how to anticipate hazards and when to start talking about them. Since she started to drive, all sorts of practices have changed, and traffic has altered dramatically; all of this she takes in stride. No longer novice, now she models for and influences those who are the new novices; she, together with the drivers around her, is evidence that the community of drivers has transformed.

TRADITIONAL APPRENTICESHIPS

This example embodies a traditional apprenticeship experience—learning a procedure and gradually developing mastery. In it, learners and teachers go through several key stages, most of which are self-evident by their names: observation, modelling, scaffolding, fading, and coaching.

Observation, both of the master demonstrating tasks and of other apprentices and practitioners with differing levels of proficiency, helps novices develop an overall conceptual model of the practice and its many skills. This provides novices with an advanced organizer for their initial attempts at performing skills. It also provides an interpretive structure to help learners make sense of the feedback and suggestions they receive from the master during interactive coaching sessions (Collins et al., 1991; Schon, 1983). In addition, it provides learners with an internalized guide or standard for use when they later work more independently. Of course, observation includes the social context in which the learning occurs. Seeing various models of expertise-in-use against which to measure their growing understanding, novices understand that there may be multiple ways of carrying out a task. Furthermore, it becomes obvious that knowledge and expertise reside within the organization of the community of practice, and is not embodied solely within any one individual. Finally, as novices observe learners with varying degrees of skill, they also come to see learning as an incremental process.

Modelling occurs when the learners observe the master demonstrating how to perform different tasks, often explicitly showing learners what to do. The learners then model their efforts on those of the master.

Scaffolding is the support the master provides to learners as they work on a task. As they begin, this may entail doing much of the task for them; as they become more adept, the master may provide only occasional hints. Slowly removing the support, and encouraging learners to take more and more responsibility for the task, is known as *fading*.

Coaching occurs throughout the apprenticeship, and consists of overseeing the students' learning. It may include choosing tasks, scaffolding and fading, evaluating work and diagnosing problems, challenging

and encouraging, working on particular weaknesses, and providing feedback.

INTELLECTUAL OR COGNITIVE APPRENTICESHIP

By contrast, when an intellectual or cognitive apprenticeship is called for, a slightly different relationship must emerge between master and learner. The focus for this type of apprenticeship is on cognitive, or intellectual tasks, which are less easily observable than the tasks of traditional apprenticeship. This approach differs from traditional apprenticeship in three ways.

First, because of the kinds of tasks involved, teachers must expressly articulate their thinking to learners in order to make it visible to them, and learners' thinking must also be made visible to teachers. This means that both teachers and learners must say what they are thinking during their demonstrations of the application of knowledge and skills. Such explicitness ensures that learners can observe and practice the relevant thinking processes, and that teachers and other learners can provide useful help.

Second, the context for these kinds of tasks—the community of practice—is often not as immediately apparent as it is in traditional apprenticeships. Because of this, teachers must explicitly place the tasks in contexts that make sense to the learners, and for which they can see some value. They must help learners answer the questions "What's in it for me? Why should I learn this? How will I ever be able to use this knowledge?"

Third, the challenge for teachers is to help novices learn when a knowledgeable skill is and is not applicable across contexts—to help them generalize the skill. This requires that teachers help them identify when to use existing knowledge in new situations.

As with the traditional apprenticeship model, cognitive apprenticeship consists of five phases, with distinctive roles for the teachers (models) and the learners (see Figure 5.1). These phases include modelling, approximating, fading, self-directed learning, and generalizing.

Remember how many masters show tacit knowing in practice, but neither know how they learned nor how to articulate it? All of us have run into teachers who cannot easily bring us into their own understanding of practice. For our second example, let's take a novice professor, newly appointed to a university. If we apply the key features of this

	Role of Learner	Role of Teacher	Key Concepts
Phase I Modelling	Observe performance of total activity, not merely the individual steps. Develop a mental model (schema) of what the real thing looks like.	Model real-life handling of complex, ill-defined and/or risky problem of practice that learner wants to perform satisfactorily.	• *articulation* • *subject specific heuristics* • *situated knowledge* • *schema*
		States aloud the essence of the activity. Includes tricks of the trade and relevant shortcuts.	
Phase II Approximating	Approximate doing the real thing in protected situations and articulate its essence.	Provide coaching to the learner. Provide support when needed.	• *scaffolding*
	Reflect on the teacher's performance. Use self-monitoring and self-correction.		• *coaching*
Phase III Fading	Continue to approximate the real thing, operating in more complex, risky, and/or ill-defined situations. Work individually or in groups.		
		Decrease coaching and scaffolding.	• *fading*
Phase IV Self-directed Learning	Practice doing the real thing on his/her own, amending as necessary. Do so within specified limits acceptable to profession and society.		
		Provide assistance only when requested.	• *self-directed learning*
Phase V Generalizing	Discuss the generalizability of what has been learned to similar ill-defined, risky, or complex problems	Discuss the generalizability of what has been learned to similar ill-defined, risky, or complex problems.	• *generalizability*

(Adapted from Farmer, 1992)

Figure 5.1 Cognitive Apprenticeship for Adults

chapter, perhaps we can design an ideal cognitive apprenticeship to help our novice professor become a "master" professor.

Example Two: An Emerging Master at University

These days, master practitioners at universities have multiple responsibilities and identities: researcher, colleague, supervisor, teacher, writer, committee member, grantswriter, administrator, examiner, and, to some extent, counselor. Perhaps our novice professor brings in what we might think of as fairly sophisticated schemas about these roles and responsibilities; after all, the entry criteria to be hired would mean he would have already spent years in an academic environment, doing many of the tasks associated with these various roles.

But therein lies the rub. Most of his exposure to the university environment has been as a student; it is of necessity "student-centric" rather than "faculty-centric". Without experience, it couldn't really be otherwise. Consider our novice sitting in his first meeting about grantswriting in his department. He, quite helpfully and with enthusiasm, chirps up about what he knows to be a successful funding strategy—at least it resulted in his successful funding for his doctoral research, and he knows it is a useful and effective prototype application. Through discussion, the inappropriateness of this approach (his schema) becomes blindingly clear. Our novice has, before, sought funding only for himself, has operated within the guidelines of a single research project (and therefore a single research budget), and has justified his research only to those panels interested in single, one-off research projects. At issue here is a multiyear funding strategy involving the department, multiple colleagues, staff support, graduate assistants, and a certain overlap with similar research nationally. One way for him to learn that his schema is insufficiently elaborate is simply to receive a rejection. But, in a consciously designed apprenticeship, he would be exposed to and participate in a gradually more complex set of roles and patterns of discourse, within the realities of practice.

Perhaps, before he ever attended such a meeting, he was required to attend an orientation lecture about these matters, or taken to one side by a mentor who discussed in some depth earlier examples of successful and rejected applications. Perhaps he accompanied a more seasoned professor on interviews of the similar research, to gain a sense of how his university's project differed. Or, on the committee, he would be asked, not to head the enterprise, but to collect data or write first drafts for certain sections of the application, to be reviewed by a colleague, and then by the entire committee. No matter the actual form of the participation, all of these would reflect the principles of engaging the novice in active, social, and authentic practice. They all offer a chance for the novice to observe and model after masters, and to reflect and explore, to engage in approximating and self-directing their own learning, before attempting, with help (scaffolding, coaching), to work toward generalizing or assuming knowledge-in-practice.

It's easy to imagine this for other professorial roles as well. Before a novice professor could supervise a doctoral candidate, for instance, she might have to serve as a member of several committees, each time taking an increasingly more responsible role. Or, before another could lead a high-profile research project, he might work first on writing up the results of the last one as a junior member of the research team. Before a third counseled a student about switching from one department to another, she would have a frank and careful discussion about the implications with her department head, more seasoned colleagues, and perhaps the registrar.

In each case, the intent would be to create a forum for articulate discussion and authentic participation in the realities of practice from within the community of practice, not from just one single point of view. Only from such active involvement, and layered and cumulative experience does the novice move toward mastery; only then is there a basis for schemas to become a web of textured, indexed information that emerges effortlessly to help generalize and effectively navigate even the most bewildering situations of practice.

SUMMARY

The Apprenticeship Perspective is around us in countless examples—in families teaching tasks and social norms to their children, and in training in trades and many professions. Still, it is useful to remember that apprenticeship is not an invisible phenomenon. It has key elements: a particular way of viewing learning, specific roles and strategies for teachers and learners, and clear stages of development, whether for traditional

or cognitive apprenticeships. But mostly, it's important to remember that in this perspective, one cannot learn from afar. Instead, one learns amid the engagement of participating in the authentic, dynamic, and unique swirl of genuine practice. Or, as one research subject put it:

> What do you do with knowledge? You don't stick it in a computer and leave it there; that's not knowledge, that's storage, right? You plug it out there somewhere and you use it, right? And if you teach your students that that's what we want you to do is store it, I mean it's a pointless exercise, and they know that, right? (Kathryn, personal communication, February, 1992)

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