

Leonard and Swap on 'Deep Smarts'

The first issue that any organization has to face is the identification of the deep smarts

[Dorothy Leonard and Walter Swap are co-authors of the new book "Deep Smarts: How to Cultivate and Transfer Enduring Business Wisdom." Leonard is a professor emerita at the Harvard Business School and Swap is a professor of psychology emeritus at Tufts, where he was also dean of the college.]

UBIQUITY: Tell us about the term "deep smarts." Is it your own term?

LEONARD: The term is one that we coined to express our belief that there's a certain subset of expertise that deserves to be identified by itself, because though it possesses many of the general characteristics of expertise it is also a very particular kind of expertise.

UBIQUITY: Particular in what way?

SWAP: For one thing, it involves having an ability to recognize patterns based upon extensive experience, and so is very contextualized expertise. For example, someone who may have a lot of book learning but not a lot of real life experience won't be able to look at a new situation and say, "Aha, that reminds me of a time when I did X," and that memory suggests a way to act. So deep smarts are connected in a person's mind to rich context. There are a lot of tacit dimensions to this kind of practical wisdom, such as the person with deep smarts may not actually be able to recognize or to put into so many words where that knowledge came from -- but is nonetheless able to react quickly and wisely.

LEONARD: Another thing that we discovered as we explored this topic was that most of the people who had deep smarts not only had an unusual capability to look at whatever operation they were expert in at a system level view, but also had the ability to dive down into the component parts. And that's not always true of experts. And that ability to fly over something at 30,000 feet and then dive down when needed into the details came from their broad and deep experience.

UBIQUITY: Broad and also deep? Both?

LEONARD: Yes. In the book we describe a physician, Eleanor Mobilia, whose specialty and deep smarts lay in her ability to fit contact lenses to the eyes of people who had undergone surgery for eye disease, and we use it as an example of the difficulty of learning that kind of experience-based smarts. After Dr. Mobilia died quite suddenly in her late 70's, her long-time associate, who was also a physician, was not able to make the same kind of judgments about who could wear certain kinds of contact lenses, even after some years of experience. So Dr. Mobilia's deep smarts had not been completely transferred to the younger associate. The point is that Dr. Mobilia, the expert, had very deep experience in this one form of medicine and so you might say, "Well, that's not very broad experience," but within that specialty she had fitted thousands and thousands of lenses, and so within that specialty she had the broadest levels of deep experience.

UBIQUITY: How did you first decide to pursue this research issue?

SWAP: Early in 2000, everybody in business was looking at the dot-com boom and all of these 20-something entrepreneurs or would-be entrepreneurs who were out in Silicon Valley starting up businesses and presumably making zillions of dollars. So we asked ourselves the question, "How is this possible, how can they have the very complex kind of expertise to start a business and make it successful?" Well, we immediately found ourselves in the midst of an interesting natural experiment -- the growth and collapse of that boom in new business models. We studied 36 of these startup companies, both before and after the implosion, and the kinds of coaching relationships their founders had. For example, who was it that was trying to bring these young people along to actually create a stable, successful company? Was it venture capitalists? Was it mentors or coaches of one sort or another? So we got very interested in these coaching relationships and we found that the issues extended well beyond startup companies, to any situation in which somebody needed to have transferred to them the necessary smarts to make something work.

UBIQUITY: Now, do you think of these smarts as being mainly technical smarts or management smarts?

LEONARD: They can be either. The technical are the easiest to identify, and they're the ones that leaders of companies are most fearful of losing. In fact, however, we would argue that deep smarts exist in other realms besides technical. Top-notch leaders, for example, or people who are deeply smart about interpersonal relationships and are geniuses at managing teams -- there are many areas where you can find deep smarts based on experience and where people have accrued this tacit knowledge that Walt was speaking of.

SWAP: That definitely includes general management experience, such as decisions about whether a company should go public, or whether they should cut their dividends, or other decisions based on what the manager has observed over a 20 or 30 year period.

UBIQUITY: Some of your examples are fairly high-level: the cardiologist and the CEO and so forth and the highly qualified programmer. What about lower levels; do the same issues apply at, let's say, the personal assistant level or the office manager level?

SWAP: That's an interesting question, because we do think of expertise as following along a continuum from novice through apprentice, and then journeyman and master, if you want to think of the old trade model. We do look primarily at those who are at the very high end, but we believe that expertise exists at all points along that continuum and that in fact in many cases it's more effective to have a relationship between two people who are closer together along that continuum, say between a journeyman coach and an apprentice protégé.

LEONARD: Yes, and this continuum exists at all levels in an organization. It is certainly true that you could find deep smarts at, let's say, on the factory floor where you have an equipment operator who knows through experience exactly how to produce some product and whose knowledge may be largely tacit. However, I think we are most concerned with the kind of smarts that are most essential to the strategy and competitive success of the company. So if that operator on the floor is involved in a key operation that in fact cannot be conducted without the help of his or her expertise, then we'd say, "Sure, you can find it at that level." I think the question is how essential is the knowledge to the operation of the organization? In other words it's not that you don't find deep smarts lower in the organization, but that the most visible ones tend to be of key people in organizations without whom the organization would really flounder. Certainly not all these people are at the top of the organizational hierarchy.

UBIQUITY: Can you think of a horror story that you could tell us?

LEONARD: Yes. We have some from NASA and JPL in the book, where there was a freeze on hiring at a certain point in JPL, the Jet Propulsion Lab, and NASA in general. For some time it was not possible to hire new people -- with the result that when a lot of young people were brought in they had very little project management experience. People at NASA, including the young people who tried to take over highly complex projects and failed, will tell you that the lack of experience has been very difficult. And some people would point to the failure of a few of the Mars missions as a result of inadequate experience on the part of the project managers and the scientists who are trying to coordinate extremely complicated projects. There are stories in the media every day about the hazards of losing hard-won experience. The New York Times recently reported, for example, that the U.S. military is very concerned about losing the abilities of the Army Special Forces who successfully built relationships with anti-Taliban commanders in Afghanistan.

UBIQUITY: Any great success stories?

LEONARD: In the book, we tell a story about two missile companies competing in the 1980s for a government contract that if won would provide literally billions of dollars to the company over the subsequent 30 or 40 years. The two competitors sent up six prototype missiles but none of them was really up to the performance demanded. In one of these companies, a scientist who wasn't even on the project

team -- but who had 20 years of experience in building missiles -- called the project team together in a large auditorium, because these are very big systems, requiring large development teams. Speaking without notes, the scientist proceeded to walk them through a complete redesign of the missiles from fore to aft, including software and hardware that he'd come up with on his own, working alone over the period of a week. And after they closed their mouths, because they were really in awe of his performance, the project team members realized that the implications of his redesign were that 400 people would have to work for a year and a half to make all the changes. Nevertheless, their faith in this guy was so strong and their understanding of the redesign and of everything that he'd proposed was so favorable that they went ahead. They won the contract and they still have it; so that's an example of how a person with deep smarts can save the day.

SWAP: With that system-wide perspective and yet the ability to dive deep down into the system.

UBIQUITY: Some of your studies went beyond the U.S. to places like Singapore, and China, and India. Tell us about them.

LEONARD: Yes, we were in India, in particular, and in Hong Kong and Singapore, and we studied one company in China. In all of those we were looking at the same phenomenon, which was that you had some very tacit contextual knowledge in the heads of people who were trying to pass it along to less experienced, and usually younger, people. So the basic issues were the same across the globe. Of course, there were minor differences in the kinds of deep smarts and the acceptance of them, but those differences were specific to the content rather than to the process. In other words, people in India, for example, when told by someone from Silicon Valley that they really should be focusing more, were more resistant to it than the young people who were given that same message, by that same individual, in the U.S. So the content was variously accepted, but the process was the same because the problem of knowledge transfer was the same.

SWAP: They had more difficulty in India accepting the idea of focusing on one thing because they were very much wedded to the business model of a holding company where you can mix all sorts of different kinds of product lines as long as you're making money on each one of them. The holding company model has succeeded in Asia, in part because most of those countries have traditionally lacked the kinds of infrastructure that the U.S. has, and the holding companies have enabled their managers to move labor and capital around where needed. So there have been good reasons to have a variety of industries all together in the same company. And yet, the Silicon Valley model was to get rid of everything extraneous and focus on one big thing and develop that.

UBIQUITY: What else in your book should we focus on now?

LEONARD: The last couple of chapters are about our belief that, as deep smarts are practice-based wisdom, they can't really be transferred from one brain to another, but must be recreated in the minds of the protégés, through knowledge coaching. We found the need for knowledge coaching to be universal, and that telling people to do things without really helping them do them and go through the behavior that they needed, was equally futile whether it be in India, Hong Kong, or the U.S. Whereas working with them more and guiding their experience was equally successful regardless of the culture.

UBIQUITY: Explain the concept of knowledge coaching and how it is actually applied.

SWAP: Rather than thinking about transferring the knowledge out of the head of an expert and into the head of a novice, we talk more about re-creating knowledge through guided experience by a knowledge coach, somebody with deep smarts who's motivated to impart his or her wisdom through coaching and who knows how to do it. And the most effective way of re-creating knowledge is not to teach in the usual sense, but to systematically guide the experience of the protégé. The coach has to guide the protégé's practice, engage in joint problem-solving, and provide opportunities for guided observation and development of simple experiments. The whole idea is to help the protégé accumulate what we call an experience repertoire—a whole menu of possible responses to various situations and problems. The protégé begins to be able to recognize patterns just as the experts can. The coach accelerates the learning process, by guiding the process, taking short cuts and providing feedback on performance.

UBIQUITY: When you work as consultants, what is that process normally like?

LEONARD: Well, the first issue that any organization has to face is the identification of the deep smarts. That's often not an easy matter, though of course sometimes it's fairly straightforward, if people clearly know their most key knowledge assets. For example, I know that at Microsoft Bill Gates has been quoted as saying that there were 20 people at Microsoft who were absolutely essential to the organization -- and presumably he knows who those are. We have a colleague at Hoffman-LaRoche, in Switzerland, who has identified six key people in his organization who are essential to the delivery of the drugs that he's in charge of. So that's the first step to figure out who are the key people -- people who have this deeply contextual knowledge. We help with that and we're also developing a more systematic way of doing that.

UBIQUITY: And after you know who the key people are?

LEONARD: Then the next step is to find a way to transfer what's in their heads to other people, to their successors. We suggest that there are less and more powerful ways of transferring that knowledge, represented by a hierarchy spanning from passive learning at one extreme to highly active. Directives, presentations and lectures are at the bottom of the hierarchy. As someone once said, "Lectures provide a way to pass the notes of the professor to the notes of the student without passing through the minds of either."

UBIQUITY: What do you do to wake everybody up?

LEONARD: Well, there are techniques for knowledge transfer that engage the brain of the learners more, such as stories with a moral. People remember advice longer when it is given in the form of a story, and a story carries more of the context that we mentioned before. But guided experience is the best way to recreate the tacit knowledge and the pattern recognition that people with deep smarts have built up over time. The reason is that, as we show in the book, the more engaged the brain of the learner, the more active and effective the learning. Only through learning-by-doing can a protégé build up the knowledge in long-term memory that forms the patterns used by experts to make their swift and seemingly intuitive decisions.

UBIQUITY: In "Deep Smarts" you also talk about Socratic questioning.

LEONARD: Yes; more active brain power is required from Socratic questioning than from listening to presentations or even stories. --We use Socratic questioning a lot at Harvard Business School in our case method, when we probe continuously the student's reasoning and ask the student to explain it back to us. And we saw the coaches in our small companies using these same methods to get their protégés to really think about and embed the knowledge that they were gaining. But recall that learning by doing, this guided experience, is at the very top of the hierarchy of passive to active learning. And so in our consulting we first try to help people understand why it is that active learning is essential to pass along deep smarts -- why it is that you can't just give a PowerPoint presentation or a lecture and think that you have actually communicated any of your wisdom. When you use such passive learning methods, the most you can hope for is that you've created some scaffolding in the person's mind that will help them structure the experience that they get later, whereas through learning by doing and through guided experience, you can really succeed in recreating deep smarts.

SWAP: Of course the problem is that it takes a lot of time and resources to do this. It's a lot easier to webcast a set of PowerPoint slides to people and ask them to pay attention to them and tell them they'll be expected to know the material. That's very different from a true apprenticeship relationship, or one in which a coach really spends time with a protégé to teach that protégé what he or she needs to know.

LEONARD: One of the suggestions we make, to lessen the costs of guided experience, is that managers consider deliberately designing dual-purpose projects, where the purpose of the project is not only to complete whatever operation is needed for the business and provide some meaningful business output, but also to provide this learning environment where the expert and the protégé can through this guided

experimentation, guided problem-solving, guided observation and guided practice, recreate some of the experience base that the expert has.

UBIQUITY: What is the target audience for your book?

LEONARD: The people we think need to be most concerned about the issues we deal with are those who are responsible for the development of their employees. The managers (and by no means just human resources managers) who are concerned or should be concerned about the organization's knowledge assets. In other words, managers of every description.

UBIQUITY: And technical managers too?

LEONARD: Absolutely. In fact, technical managers are quick to see why what we write about is so critical.

SWAP: Yes, if they're thinking strategically then this topic tends to resonate with them. If they realize that they're going to be losing a lot of people to retirement, or if the people from India or China who are working in the U.S. start finding great jobs back home, managers know they need to do something. Where are they going to get the expertise, the deep smarts that are necessary strategically for their company or for their division?

LEONARD: So it really is important for them to start by understanding how people learn. People do not learn this kind of expertise through books or presentations or any other way than through guided experience. They could also learn it just from random experience, but learning it that way is inefficient.

UBIQUITY: Your use of the word "learning" prompts this next question: is there any particular application of the book at places like Harvard or Tufts -- or would you get blank stares in the faculty room?

SWAP: Absolutely -- you've struck a very responsive chord with me. At my institution, Tufts, there's a tremendous amount of variability in terms of how much coaching goes on. For example, how do you coach the next generation of teachers? Well, the usual way is, you throw them into the classroom and eventually they pick it up, and there's very little sitting in on colleagues' classrooms and providing them with feedback -- much less than happens at Harvard Business School. When I became Dean at Tufts, there was virtually no coaching that I received on how I was going to perform my duties. The assumption was, "Oh well, you've been a professor and a department chair for 20 years, surely you know how administration works, so go do it." So it's a very inefficient process and I'm planning on sending a couple of copies of the book to strategically placed people at my institution.

LEONARD: But as Walt said -- and actually to the surprise of anyone who comes to the Harvard Business School for the first time -- that's an institution that pays a great deal of attention to this issue, and increasingly so. There used to be more of an apprenticeship attitude towards teaching, then it was lost for a little while, and then it came back. Senior faculty at the business school are expected, even required, to sit in on junior faculty's teaching to coach them and give them feedback. And there are also semi-formal apprenticeship practices there, because the case method is not one that is taught in the usual doctoral program curriculum. Of course, as Walt said, most professors are never taught to teach anyway, but because it's such an extraordinarily important part of the culture at the business school, there's an inordinate amount of emphasis put on learning to teach the case method.

UBIQUITY: Have you ever had anything to do with "expert systems"?

LEONARD: Yes, quite a bit, actually.

UBIQUITY: What's your take?

LEONARD: Yes, in the mid-1980s I actually studied the beginnings of expert systems. Digital Equipment had one of the very first industrial expert systems in use-- something called "Xcon," which was used to help

configure computers during assembly; then they tried to transfer that system over to Sales, in a system called XCEL.. These were rule-based systems, and were the beginnings of commercial expert systems. Some of the early proponents of expert systems, people like Ed Feigenbaum, would argue that given enough time and enough money, they could recreate every bit of the knowledge that's in your head. I don't believe that's true for deep smarts. I think that the type of knowledge we're talking about is so contextual and situational that it would be impossible to extract it except through producing every conceivable situation and context that the expert would have experienced. Granted, to a certain extent you certainly can get some tacit knowledge out of people's heads; and you can certainly extract rules; and you can certainly get a lot further along towards mimicking the decision-making process that an expert goes through. But I think of the rule-based system that attempted to replicate the reasoning of a Campbell's Soup expert, who spent a lot of time flying around the world helping people debug their cookers, and then they engineered an expert system that was intended to replicate that knowledge. The system was very helpful to people, no question; but did it capture all of the expert's knowledge? No way! The deep smarts we're talking about, and the pattern recognition, will not be captured through rule and rule-based logic.

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