
Using Mentoring and Storytelling to Transfer Knowledge in the Workplace

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ABSTRACT: The core capabilities of an organization include critical skills of employees, management systems, and norms and values. Core capabilities may be transferred formally and explicitly. However, much knowledge, particularly knowledge with rich tacit dimensions, is transferred informally through processes of socialization and internalization. We focus on two transfer mechanisms—mentoring and storytelling—that can leverage the knowledge of an organization, particularly its tacit knowledge, to build core capabilities. We draw on relevant research in learning and cognitive psychology to clarify the conditions under which mentoring and storytelling can be most effective as carriers of knowledge. Finally, we present recommendations for specific managerial practices that follow from our analysis.

KEY WORDS AND PHRASES: cognition, core capabilities, informal learning, mentoring, stories, tacit knowledge

KNOWLEDGE ASSETS, OR CORE CAPABILITIES [19], are the means through which organizations compete in the marketplace. As numerous scholars and practitioners have noted, a large proportion—perhaps the most critical parts—of such capabilities are intangible knowledge assets [6, 14]. That is, the intangible assets exist in the tacit dimensions of knowledge, built up over time in peoples' heads, hands, and relationships. Knowledge management is challenging because these intangible assets accumulate in the organization through dynamic, unstructured, and often subtle processes that are not easily codified into formal training programs or captured in information systems. Attempts to transfer knowledge assets within and across organizations (e.g., embedded in best practices) have met with incomplete success [49] in part because of their tacit dimensions. Insight into why such transfers are difficult is provided by Nonaka and Takeuchi's characterization of the transfer of tacit knowledge from one set of individuals to another as "socialization" and the transfer of explicit to tacit knowledge as "internalization" [32]. We argue in this paper that managerial influence over these essentially cognitive processes depends upon understanding how individuals within and across organizations informally teach and learn. Although such informal learning occurs in many settings and in multiple ways, we selected two interrelated mechanisms for study and reflection: mentoring and storytelling. Our criteria for selecting these two were: (1) these mechanisms, more than others, promote the transfer of the tacit dimensions of knowledge; (2) mentoring and storytelling are clearly understood representations of internalization and socialization and relatively easily implemented in organizations; and (3) existing management and cognitive psychology literature can be mined to inform managerial action.

Research Background

THE PRIMARY OBSERVATIONS IN THIS PAPER are derived from literature in management and cognitive psychology. From an initial literature search on mentoring that yielded hundreds of citations, 68 from journals or books were selected for review and narrowed to 27 that either reported specific empirical studies or reviewed such research. The most rigorously conducted of these tended to focus on specific, such as gender-related, mentoring situations. The literature on storytelling was similarly winnowed from 115 citations to 44 empirical studies (including case studies) or research reviews. Intersections with the cognitive psychology literature were sought by reviewing research on informal learning, including aspects of implicit learning, memory, and development of expertise. Moreover, the two senior authors are currently conducting an extensive field study on mentoring upon which we draw for managerially

relevant illustrations. Since January 2000, we have been interviewing mentors of start-up companies and the teams being mentored in Silicon Valley, Boston, Washington, DC, India, Singapore, and Hong Kong. Our broad concern has been to track the flows of knowledge between experienced entrepreneurs serving as "mentor capitalists," as well as venture capitalists and incubators, and those aspiring entrepreneurs whom they are coaching.¹ As of this writing, over 100 interviews have been completed, about evenly divided between coaches and coached. These rich data are currently being coded and formally analyzed. Findings will be reported in future publications.

The Nature of Expertise and Knowledge Transfer

SCHOLARS STUDYING KNOWLEDGE MANAGEMENT often point out that knowledge accrues through experience. Leonard and Sensiper define knowledge in the business context as "information that is relevant, actionable and at least partially based on experience" [20, p. 113], and Davenport and Prusak speak of knowledge as "a fluid mix of framed experience, values, contextual information and expert insight" [9, p. 5].² But how does one become an expert? True expertise, as contrasted with competence, takes at least 10 years to develop [43] and there is little evidence that the process can be significantly accelerated. Whereas history provides some examples of true inborn genius, even chess prodigy Bobby Fischer required nine years of intense preparation to attain international stature. Expertise is developed through learning-by-doing. Even the most gifted must practice, practice, practice, almost always under the guidance of a more knowledgeable teacher. This is not to say that anyone can develop expertise through sufficient diligence. Rather, between 2 people of equal natural ability, the one who becomes more expert is the one who engages in the activity more, be it music composition or law or entrepreneuring.

The way that experts exercise their knowledge is by calling on their long years and countless experiences in a great variety of contexts to recognize *patterns*. They then can selectively retrieve relevant information and extrapolate from a given pattern to fluidly chart an appropriate response [11]. It is always possible, of course, that experts will extrapolate incorrectly, misguided by a few familiar cues into believing they have identified a well-known pattern. However, assuming that they are correct, it is often difficult for them to describe the pattern precisely or to articulate how the recognition of a given pattern should lead to some specific behavior. In short, this pattern recognition process draws upon the tacit dimensions of the expert's knowledge, underlying the more explicit (and explicable) rule-based reasoning they also excel at. Experts can express rules of thumb, but these shorthand statements are deeply contextualized [42]. The expert knows when the rule applies and when an unusual pattern of experiences requires an exception. In general, the rule of thumb, "focus, focus, focus," will be appropriate to an entrepreneur attempting to develop a new business, and it is a rule that can be easily learned—if not easily put into practice. An experienced mentor, however, knows that there are times to broaden the range of activities. In our research, for example, a mentor working with an entrepreneur in a

very early-stage start-up company first urged focus, then realized that the market for the company's product was not clear. He therefore urged temporarily pursuing three potential markets and allowing the outcome of the experiment to dictate the final market. Whereas the rules are easily transferred, the pattern recognition that allows a decision about when to apply the rule is not so easily taught.

Another mentor described his own ability to work with start-up businesses by recognizing patterns:

You have these models you carry around. . . . You have hired, promoted and fired hundreds of people in your life, you have seen the way it looks; during the interview, you have seen the way people do and don't tell you certain things in the referencing process; you have seen how people are either political or non-political. . . . After awhile, you say about a given situation: That's going to be one of these, . . . you can project what's going to happen.³

These 2 characteristics of expertise, the 10-year rule and pattern recognition based on experience, both constrain the ability to transfer knowledge from experts to novices—especially its tacit dimensions. However, in their seminal work on knowledge creation, Nonaka and Takeuchi suggest 2 processes by which the tacit dimensions of knowledge can be created and transferred. The first, internalization, "is a process of embodying explicit knowledge into tacit knowledge. It is closely related to 'learning by doing'" [32, p. 69]. The second is socialization, which they define as "a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills" [32, p. 62]. While formal instruction may be involved, internalization and socialization generally occur through informal processes.

People drink in knowledge informally and, at times, unconsciously. That is, they learn much incidentally, while eating in the cafeteria, chatting in the halls, observing their colleagues' and supervisors' behavior—and through the vicarious experience of others. Therefore knowledge transfer can occur even in the absence of deliberate intention to teach or learn. However, experienced individuals in an organization can help newcomers or novices interpret events, understand technology and business processes, and identify the values and norms of an organization. The processes of internalization and socialization can be aided or hindered by such organizational experts—and this informal learning can be encouraged or discouraged by management practices. Two potential avenues for informal teaching are mentoring and storytelling, and we turn now to a discussion of each.

Mentoring as Informal Teaching

THE WORD *MENTOR* CAN BE TRACED BACK TO HOMER'S myth of Odysseus. The king of Ithaca left his son Telemachus in the care of Mentor, who guided and taught the youth for the 10 years his father was away fighting the Trojans. A mentor, therefore, has always been considered one who draws upon a deep knowledge base to teach and guide. The recognition of mentoring as an important transfer mechanism for knowl-

edge within organizations has grown significantly in the past couple of decades. However, the mentoring literature focuses primarily on how to structure the mentor/protégé⁴ relationship [31], on the desired behavior of mentors [3], and on identifying mentoring functions [17, 18]. The benefits of mentoring are measured in enhanced job satisfaction and retention [28] but, in the 68 articles reviewed, none tested the relationship between mentoring and an increase in organizational knowledge. However, a number of studies have found that individuals who are mentored perform better and are promoted more rapidly [23, 39], presumably because they have learned and absorbed knowledge from their mentors. Clearly, whether officially appointed or not,⁵ mentors are serving as informal teachers, and knowledge is being transferred.⁶ In recent years, the concept of mentoring has been extended to include peer-to-peer help [8, 18] and "reverse mentoring," or protégé-to-mentor learning [29].

What Are Mentors Teaching?

Most discussions of core competencies [35] or dynamic capabilities [50] focus on two dimensions of the knowledge assets: critical skills and managerial systems. But Leonard-Barton [19] suggests that norms and values are equally important in building knowledge assets, as they govern how and whether individual employees create, access, absorb, and diffuse different kinds of knowledge.⁷ Therefore we might expect to see all three types of knowledge as the content of mentors' teachings.

Looking first for evidence that mentors transfer *skills*, we find surprisingly little in the mentorship literature about the informal learning of *technical* skills. One can infer that technical expertise is built up, in part through the mentor feedback mentioned by numerous researchers [3, 7, 34] or in the coaching mentioned by Noe [31]. Kram describes coaching as part of the career function filled by mentors [16]. Benabou and Benabou [3] include training the protégé in "technical and managerial skills" in their category of "professional function" performed by mentors. One study [27] that investigates the sources of information sought by newcomers in organizations found that newcomers sought technical information, defined as "how to perform specific aspects of your job" primarily by asking others—mostly supervisors.⁸ This kind of information was more often sought through direct inquiry than through what Morrison calls monitoring (observation). Morrison speculates that "because technical information is highly valuable, yet difficult to obtain through monitoring, newcomers may be willing to ask for it directly" [27, p. 582]. In our research on the mentoring of start-ups, we found some support for this notion, as we observed mentors responding to top management's requests for explicit technical knowledge, such as advice on valuation of the fledgling company or explanations of legal processes. Similarly, Covaeski et al. [7, p. 314] report that some mentors in the accounting firms they studied provided "guidance and advice [that] could be highly specific and 'gritty,' covering the protégé's relationship with clients and key partners, the commercial aspects of the firm, the protégé's appearance and behavior and the politics of practice."

The literature provides much more evidence of mentors conveying knowledge about organizational routines and *managerial systems*. "Through career functions including

sponsorship, coaching, protection, exposure and visibility, and challenging work assignments, a young manager is assisted in learning the ropes of organizational life and in preparing for advancement opportunities" [16, p. 614]. Mentors also identify opportunities for training [12, 53]. Perhaps even more important is the knowledge of informal managerial systems conveyed through what some researchers call the "political function" of the mentor [3] or refer to as the "power perspective" [36]. These terms cover a wide variety of information about who does what and how in the organization. Benabou and Benabou [3] find that mentors provided "access to privileged information" and familiarized the protégé "with nonformal aspects of the organization." Wilson and Elman [57] suggest that mentors teach their protégés "how to navigate the subtleties of the organization's political system." Particularly useful is "know-who," that is, introductions to influential "decision-making networks" [3] and contacts developed by the mentor [12, 34, 44, 55]. Our research amply demonstrates the important role mentors play in introducing start-up teams to sources of management talent (including search firms), financing (e.g., venture capitalists and angel investors), and potential partnerships [22].

Mentors also teach *norms* of behavior and convey knowledge about the *values* of an organization—what Morrison [27] calls "normative information." Norms imply guidance for behavior. Covalleski et al. report: "Mentoring requires that the mentor display himself or herself to the protégé as an embodied symbol. According to one [mentor], 'Being a good mentor means making myself visible to my protégé in order for him to more fully understand what it means to behave, look like, and be a partner'" [7, p. 314]. However, many mentoring studies tend to lump norms and values together¹⁰ under the rubric of organizational culture. "[M]entoring succeeds in efficiently transmitting the enterprise culture, as measured by the acquisition of language (casual and technical) specific to the enterprise, and the adoption of company values and traditions. Official channels of communication are too slow and cumbersome, but high-level mentors close to strategic decisions can quickly communicate the meaning of those decisions to their protégés, facilitating the adoption of the company values" [3, p. 9]. Our research reveals that setting the values for a startup company occurs very early in the mentor-protégé relationship—often at the first meeting. We repeatedly were told by mentors and their teams that they consciously chose one another on the basis of shared values, for example, the desire to grow a business of enduring worth rather than just to make a quick sale and profit ("build to flip").

We conclude from the literature review that there is little evidence of a direct positive relationship between mentoring and organizational performance. However, mentoring does play a role in building up the core capabilities of an organization, as the literature offers evidence for the transfer of skills, managerial systems, and values—including their tacit dimensions. The mentoring process fits the descriptions of both socialization ("sharing experiences") and internalization ("embodying explicit knowledge into tacit" and "learning by doing").

Next we consider what prior research can tell us about *how* the informal learning via mentoring takes place.

Cognitive Mechanisms in Learning via Mentoring

Novices cannot be expected to leap directly to becoming experts. All experts pass through levels of knowledge acquisition. In trades, one thinks of first apprenticing, then becoming a journeyman, before attaining the status of a master violin maker or plumber. Future concert pianists start as beginners, then reach intermediate and advanced levels before becoming virtuosi. For mentors working with novices, the wide gap in knowledge presents problems. Experts may lack patience to guide a novice, and, from the novice's viewpoint, someone more proximate in experience may be a better teacher than the expert because the knowledge gap is not as great. The literature on cognition suggests both why wider gaps are harder to bridge and how informal learning occurs.

Preparedness for Learning. Lacking the necessary knowledge and experience foundations, the novice has no "hook" or receptor to truly assimilate the mentor's instructions. Cognitive psychology tells us that "[e]xperiences are encoded by brain networks whose connections have already been shaped by previous encounters with the world. This preexisting knowledge powerfully influences how we encode and store new memories (or vicariously experienced events conveyed through stories)" [40, p. 6]. In order for information to become knowledge, the learner must share some context, some meaning, with the one imparting the knowledge. Lacking that shared contextual base, messages will be assimilated to people's own idiosyncratic experiences and memories [40]. To extrapolate from Vygotsky's [54] insights into childhood intellectual development, the information lies outside the protégé's "zone of proximal development." As experiences accrue, perhaps under the guidance of a mentor, the learner becomes increasingly prepared for more advanced instruction—his or her zone of proximal development widens.

Active Learning. Theorists and practitioners are unanimous in claiming the importance of active learning in building up exposure to patterns that are at the heart of developing expertise [42]. Research in cognitive psychology confirms that when people actively participate in learning new material they are much more likely to remember it. For example, a word is more likely to be recalled later when it is "filled in" by the learner ("What word starting with the letter *F* is a synonym for *rapid*?"") than when *fast* is simply provided as a synonym (the "Generation Effect," [47]). In our study of "mentor capitalists," we find mentors suggesting experiments through which the green entrepreneurs can learn: One mentor urged presenting a prototype to a different customer set than was currently being courted. Another required her protégé to personally conduct informal market research on the meaning of his brand. Noe cites a study revealing that mentors for women executives had "created opportunities for them to operate outside of the organizational norms . . . and provided an environment that was conducive to experimenting with new behaviors and ideas" [31, p. 66]. The management literature identifies such actions as increasing the protégé's responsibility for projects and leadership [13, 16, 34] or allowing the protégé to make his or her own discoveries [48]. Providing actual (or, as with case studies, virtual)

learning experiences is crucial to the development of expertise, and the resulting enhanced ability to recognize patterns.

Metacognition and Self-Monitoring. The term "metacognition" (self-aware thinking about one's own mental processes) has entered the lexicon to describe how people monitor their understanding of a problem, recognize what additional information they need for more complete understanding, and seek out that information. Experts typically self-monitor their understanding in this way and they can teach by asking questions to elicit the protégé's degree of comprehension, then reflecting the answers back in ways that encourage deeper exploration of the issues. This type of Socratic dialogue is a variant of active learning and internalization, but one concerned more with learning by thinking than learning by doing. One of the protégés we interviewed said that he learned a great deal about the business strategy of his company through self-reflecting on the answers he was forced to give to the questions asked by his mentor. Several protégés interviewed in our study acknowledged the value of "hammering" by mentors to think deeply about their company's mission, their strategies, and the "elevator speech" describing their companies. Feedback by the mentor is an important part of this process—feedback about whether the mentor believes the protégé has actually absorbed the lesson. Current research indicates an important point for mentors and managers: Feedback that focuses the learner on the task is particularly helpful in learning and feedback that focuses attention on the self (e.g., how competent or incompetent a person one is) is generally harmful to learning [15].

Learning by Observing. American behaviorists long assumed that people learned solely as a result of reinforcement or punishment. However, research revealed that children and adults also learn through simply observing others—particularly models who are trusted, powerful, or otherwise valued, even in the absence of any reinforcements and whether or not the mimics intended to learn [2]. "What is critical to memory is how one processes material and not whether one intends to learn the material" [1, p. 192]. Thus, when novices are immersed in an organization or culture they value, and are being mentored by an expert they admire, a great deal of learning can occur through observing the expert's behavior. Brown, Collins, and Deguid emphasize the importance for learning of becoming part of a culture in which activities are "authentic," that is, "coherent, meaningful, and purposeful. . . . What people pick up is a product of the ambient culture rather than of explicit teaching" [4, p. 34]. In our research, some of the mentors assumed the role of "virtual CEO," taking on many of the top-level executive functions of the new company while the protégé observes—and learns. One of the protégés noted that his mentor, who came into the company as acting president, demonstrated how to effectively build the team, establish priorities and budgets, and manage disputes. An expert's modeling of behavior for a protégé clearly reflects Nonaka and Takeuchi's "socialization," in which learning takes place informally and often unconsciously.

In addition to encouraging hands-on experiences, providing feedback skillfully, and serving as models, mentors have the ability to draw on their extensive experiences to relate stories to protégés. Ibarra notes, "The most successful junior professionals repeatedly mentioned how much they were helped by a partner who took the

time to tell them stories about the business and how to succeed as a partner" [13, p. 153]. We turn now to consider in depth the role of stories in conveying knowledge—whether or not the stories are related by people considered to be mentors.

Stories as Informal Teaching

WE DEFINE AN ORGANIZATIONAL STORY AS *a detailed narrative of past management actions, employee interactions, or other intra- or extra-organizational events that are communicated informally within the organization*. Such narratives will ordinarily include a plot, major characters, and outcome. A moral, or implication of the story for action, is usually implied if not explicitly stated. Normally, these stories will originate from within the organization and will therefore reflect organizational norms, values, and culture. However, mentors from outside the company may use stories from their past experiences to dramatize critical skills, managerial systems, and norms and values common to many organizations. Organizational stories tend to cluster within familiar archetypes. For example, Martin and her colleagues [25] have identified seven types of common stories that occur regularly across a variety of organizations:

- The rule-breaking story
- Is the big boss human?
- Can the little person rise to the top?
- Will I get fired?
- Will the organization help me when I have to move?
- How will the boss react to mistakes?
- How will the organization deal with obstacles?

Cognitive science research tells us that *memorable* information is more likely to be acted upon than is information that remains unconscious and not retrieved from memory. Therefore, anything that tends to make information more memorable will have a greater likelihood of assuming significance. Because stories are more vivid, engaging, entertaining, and easily related to personal experience than rules or directives, the research would predict they would be more memorable, be given more weight, and be more likely to guide behavior. In addition, because of the rich contextual details encoded in stories, they are ideal carriers of tacit dimensions of knowledge (although what is ultimately encoded by the listener may not correspond closely to the intentions of the storyteller [41]).

What Are Stories Teaching?

Stories do not lend themselves equally well to transferring different kinds of knowledge. As a *strategy* for building core capabilities within an organization, an indiscriminate use of stories to transfer critical skills, managerial systems, and norms and values would probably be misguided. Critical skills, including deep knowledge of a content domain, would be very difficult to transfer via stories. For such concrete

forms of knowledge, people rely on formal education, apprenticeships or mentoring, training programs, and self-study for mastery. Indeed, we know of no studies where critical skills have been transferred by stories. Martin has noted, "Organizational representatives prefer to use explicit, unambiguous means of communication, whenever this is possible, so that misunderstandings and differences in interpretation will not occur" [24, p. 257].¹¹

The use of stories to communicate managerial systems does occur. An incident from our research on mentoring start-ups illustrates:

A green CFO reports to his board that he intends to invest the company's free cash to produce some additional income. One board member, an experienced entrepreneur, relates the story of another CFO who proposed to invest his company's cash in a high-yield instrument. The sage on his board responded, "No one will remember the extra 1½% you earned. They will remember the \$10 million you lost."

Or consider another story, related by Wilkins, typifying Martin's "Will I get fired?" archetype:

Hit by hard times, a company chose not to fire 10% of its people, but instead required everyone, including top management, to take a 10% pay cut in exchange for working nine days out of ten [56, p. 46].

In this story, the more explicit knowledge being transferred is about how things get done in the company (managerial systems). However, the implicit message is that all employees are important, and that in times of crisis, everyone works together as a team (values).

One of the bitter truths about successful management systems in start-ups is that founders are often moved aside as the company grows and requires different skills. In our research, mentors sometimes communicated the likelihood of a CEO succession through stories. One founding team of a young company told their mentor that they wanted the current president to be given the title of CEO. The mentor dissuaded them by relating the story of a similar situation:

A founder/CEO was well liked by his team, who wanted him to be named permanent CEO. But the mentor realized he lacked the full skill-set to take the company to the next level and said no, much to the displeasure of the team. Several months later, the correctness of the decision was clear when the founder admitted that the mentor had been right, that he had learned a great deal that would eventually make him CEO material.

The mentor had recognized a familiar pattern, communicated this through a story, and persuaded the team of the wisdom of his decision.

Organizational values are more clearly and unambiguously illustrated in the following story—a good example of Martin's "How will the boss react to mistakes?" archetype:

A mill superintendent at Chaparral Steel championed a very expensive magnetic arc saw for trimming finished steel beams. The resulting magnetic fields attracted bits of metal and persistent engineering attempts failed to correct the problem. The saw was ultimately replaced but the superintendent was promoted to vice president of operations [19, p. 119].

Here, the value placed on intelligent risk-taking at Chaparral Steel is highlighted. Employees know that if they have a creative idea that is supported by the company, they will not be punished if that idea fails to work out. It is assumed, instead, that the person will learn from the mistake and will be a more valuable member of the company.

Several important points about the transfer of knowledge are illustrated by these stories. First, managerial systems, norms, and values can be readily communicated through the narrative and its (often implied) moral. Stories, particularly those that are concrete and readily identified with, are particularly powerful for transferring knowledge rich in tacit dimensions. As earlier noted, knowledge about skills and domain content relies on more explicit, codified means of communication rather than on stories.

Second, a single story, richly contextualized, may communicate knowledge, often tacit, about more than one component of a company's core capabilities. For example, a variant of the "dealing with obstacles" story tells how employees making presentations to top management can expect to be savaged—yelled at, demeaned, their papers hurled on the floor. While at the explicit level this story might not speak flatteringly of these particular organizational values or managerial systems, the tacit moral transferred to many employees is that management cares about quality, and survival of this initiation will launch you on your career [56, p. 46].

Third, when the story supports the explicit statements of the company (as these all do), they provide powerful reinforcement and buy-in by members [24]. But stories do not always support more explicit forms of communication. And when the story conflicts with explicit statements, the tacitly conveyed moral from the story may well overpower the explicit message. Moreover, for each of Martin's seven story types, there are negative as well as positive exemplars. For every positive "the big boss is human" story, there is probably at least one depicting the boss as a jerk. Neuhauser [30] surveyed 100 people across many organizations and found that 90 percent told *negative* stories about their companies.

In the following example, management failed to recognize the power and persistence of negative stories, and therefore missed an opportunity for progress.

A consultant hired to work with top management to promote innovation in a large manufacturing company asked about the climate for risk-taking. The managers shook their heads. "Our new CEO," they told her, "has talked a good game ever since he came in four years ago; he says he wants us to take risks—but you really can't." Pressed for evidence, the managers recounted several stories about specific employees whose careers had derailed after they took risks. However, every single story was at least eight years old, predating the current CEO's tenure. The sad tales about the dangers of risk taking had not

been replaced in the corporate lore with any positive stories. The CEO was unaware of the powerful myths still lurking in the organizational culture—and influencing current behavior.¹²

In this particular “How will the boss react to mistakes?” story, the boss did, in fact, genuinely wish to encourage intelligent risk-taking. But the continued circulation of vivid, powerful, but out-of-date stories undermined his stated value.

If stories are powerful, then we need to understand *why* they are in order to benefit from their potential for knowledge transfer and to alleviate their negative effects.

Cognitive Mechanisms in Learning via Stories

The availability heuristic. When an event is made more available from memory, there is a strong tendency to believe it is more likely to occur or to be true [52]. For example, it is far more likely that a hiker will be killed by a moose than by a grizzly bear. However, because of the stories most of us have heard about gruesome bear-maulings, and the scarcity of tales of moose-tramplings, we have vivid images of the former and tend to exaggerate their likelihood. Therefore, if aspects of corporate culture or systems are made more vivid, such as through a story, the availability heuristic predicts they will become more memorable, more thoroughly processed, and judged to be more true than those supported only by probabilities or abstract data.

An experiment by Joanne Martin and Melanie Powers [e.g., 24] provides an empirical example. Stanford MBA students were presented with an advertisement for a new white wine from a California winery. All students read advertising copy consisting of a policy statement arguing that the winery would be consistently using special procedures from the Chablis region of France. Some students read only this paragraph, while others also read a supportive story about how the founder of the winery would be making his wine with the new procedures. A third group read just the policy statement and numerical data supporting the statement (i.e., how frequently the new procedures would be used). A final group read both the story and the data. Even though these quantitatively oriented MBA students indicated that they thought the data condition would prove to be a more persuasive advertisement, those who had read the story were more convinced of the truthfulness of the policy statement than were those in the other conditions. According to the availability heuristic, or the “vividness effect,” the story made the new procedure more easily imaginable and, hence, judged more likely to be true.

Elaboration. To the extent that people reflect upon and integrate information with what they already know, they will remember it better. “What we already know shapes what we select and encode; things that are meaningful to us spontaneously elicit the kind of elaborations that promote later recall” [40, pp. 45–46]. For example, we remember information better when we can elaborate it by constructing vivid images drawn from our own experience to organize it. Indeed, a common mnemonic for memorizing lists of words is to conjure up visual images or construct a narrative that includes each item [40]. When verbal or numerical data are presented, we have only

one obvious means of encoding them. If, however, the same information is presented and encoded with associated vivid images, there are two different ways of retrieving the information, making it more accessible [33]. Stories provide a simple way of combining verbal and visual information. If the story is sufficiently clear or dramatic, it will almost certainly stimulate visual images complementing the story line, providing a vicarious experience that results in a greater likelihood of being remembered.

Episodic memory. If you were asked to recall the capitals of the countries in the European Union (EU), you might have difficulty. How many countries are there in the EU? What are they? Is Bonn or Berlin the capital of Germany? If, however, you have just taken a grand tour of the European capitals, you would probably be able to recall them and, with a little thought, even recite them in the order visited. Furthermore, you would be able to reconstruct highlights in each city—castles explored, special meals eaten, and so on. The recall of events directly experienced is called *episodic memory*, while general knowledge about the world (including the names of those capitals) is called *semantic memory* [51]. This is not to say that errors in episodic memory will not occur—was that cathedral in Madrid or Lisbon?—but those memories grounded in personal experience tend to be readily retrieved, perhaps with a bit of priming (“Wasn’t that a glass of port we drank in that little restaurant outside that cathedral?”). Recent evidence suggests that for episodic memory, information is stored immediately in the hippocampal region of the brain, then transferred slowly to long-term storage in the neocortex [26]. The result is a “seemingly unlimited storage for everyday experiences, and a retrieval system that allows us to access the experiences with partial activation of their components” [26]. Stories are clearly episodic in nature. To the extent that the storyteller is able to provide a sufficiently vivid account for the listener to vicariously experience the story, many features of the story will be encoded in memory and will be readily available for retrieval.

The evidence from cognitive psychology, then, is quite consistent. To the extent that stories promote elaborations such as connections to the listener’s personal experience, or evoke clear visual images, they will be more memorable and, hence, more effective carriers of knowledge than less vivid, purely listed information. More important, rich narratives are more likely judged as true or likely to occur. “If you want people to remember information and believe it, your best strategy in almost every case is to give that information in the form of a story” [46, p. 26]. Denning [10] has written a fascinating, first person account about his discovery of the persuasive merits of stories over rhetoric in transforming the World Bank to a knowledge-conscious organization.

Managerial Implications

WE SUGGEST IN THIS ARTICLE that skills, managerial systems, and norms and values, woven into interdependent systems of knowledge termed core capabilities, are critical to any organization. These types of knowledge, and especially their tacit dimensions, are conveyed through processes of socialization and internalization. Two mechanisms key to those processes are mentoring and storytelling. Managers need to

be aware of and understand the cognitive processes underlying these types of informal learning. Our review of the management and cognitive psychology literatures on the two processes leads to a number of managerial implications. In Table 1, we summarize the major research findings (column 1) and draw implications from each finding (column 2). Each of these in turn suggests specific managerial actions (column 3). Note that column 3 represents only a sample of possible actions—many more could be developed.

Most mentors are in a position to teach because they have developed expertise through years of practice in a particular field or organization—not because they desire to teach or have expertise in mentoring. The potential behaviors suggested in Table 1, derived from research on how people learn, are not necessarily obvious—and they are neither quick nor easy to implement. Nor are they efficient in the short term. Mentors who follow these suggestions will be superior teachers, but will managers reward them for working at transferring their expertise? Even one of the easiest, allowing a protégé to shadow a mentor, requires the presence of two people where only one is strictly required. Shadowing activities are not billable in most companies.

Moreover, not all experts know how to bridge the gap between their own knowledge and the fragmentary or incomplete experience base of the novice—even assuming that they are willing to try. The larger the gap, the more effort is required to close it from both mentor and protégé, and the more frustration in incomplete communication is likely on both sides. In our own research, we saw some experts who were extraordinarily patient with novices and skilled at assessing the protégé's level of understanding so that the necessary knowledge could be fed in calculated dosages and couched in accessible language. In other cases, experts were highly frustrated at the discovery of how basic was the knowledge that the protégé lacked. As suggested in Table 1, mentoring systems could include teaching by those with proximate knowledge (e.g. apprentices teaching novices) in order to better close knowledge gaps. We also observed in the field newly minted entrepreneurs—apprentice level in their understanding—mentoring novices with apparent success.

An inescapable implication of this research is that mentoring takes time and continuity. Two forces militate against the transfer of expertise from a mentor to a protégé: the time pressures in organizations, both business and nonprofit, and the increasing tendency for individuals to work in many different organizations, picking up experience and expertise from many different individuals. However, these trends in society may in fact create higher demand for mentoring relationships, not only because people will have less time to “come up to speed” on their own, but because individuals will need to be active and continuous learners as they move from one organization to another. As higher value is placed on expertise, managers will need to become increasingly skilled at recognizing the potential for apprentices and journeymen to teach and encouraging knowledge flows between individuals further down the ladder of experience depicted in Figure 1.

Mentoring requires a light—and sophisticated—managerial hand. Therefore, merely setting up a formal mentoring program may accomplish little, especially if the mentors are uninterested and neither rewarded nor skilled in teaching. Rather, managers

Table 1. Selected Managerial Implications of Cognitive Science Research

Cognitive Principle	Implication	Examples of Potential Behaviors
Active engagement in one's own learning improves learning.	Providing opportunities for active learning will enhance learning.	Mentors design active learning exercises. Give protégés responsibility for projects.
Lack of receptors (knowledge base) makes it difficult for inexperienced people to learn.	The wider the knowledge gap between mentor and protégé, the more difficult the knowledge transfer.	Apprentices and journeymen can be mentors for novices. Experts may need tutoring in how to teach.
Self-monitoring and self-reflection on one's own learning progress leads to better learning.	Protégés will learn better if they are self-reflective about their learning.	Mentors should assist protégés in becoming self-reflective, providing feedback about protégé's progress that is specific to tasks (rather than personal).
People learn from observing models of behavior, particularly admired or powerful models.	Learning may be informal. Teaching may be unintentional.	Protégés should be allowed and encouraged to "shadow" their mentors.
Developing expertise takes years and much practice.	There are no rapid shortcuts, but there may be superior routes to knowledge transfer.	If time pressures are not to drive it out, mentoring has to be rewarded and built into the organizational systems.
The hallmark of expertise is the ability to recognize patterns and draw inferences from them.	In order to become experts, protégés have to accumulate many experiences from which they can derive patterns.	Mentors need to provide real experiences or many simulations and cases for protégés.
If information is expressed in memorable form, it will more likely influence attitudes and behavior.	Stories are more effective than statements in transferring knowledge. Confronted with a published norm and a contradictory story, people will tend to believe the story.	Managers need to mine organizational culture for stories that support values, norms, and managerial systems important to the organization's core capabilities.

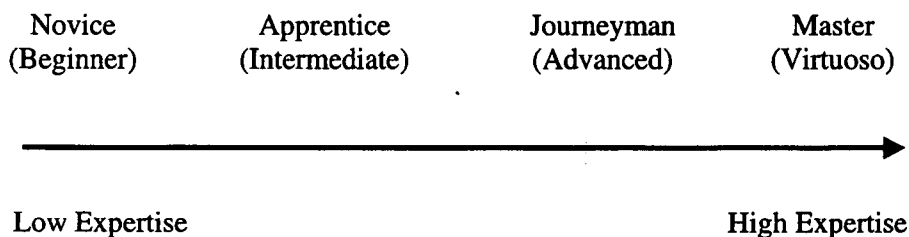


Figure 1. Continuum of Expertise

need to consider how to structure incentive systems so that mentoring is rewarded and recognized as a valuable contribution to the organization. Mentors and protégés who select each other will be more successful than will those who are appointed. Moreover, mentors should be given some help in becoming more effective teachers.

There are also implications from our study of storytelling. Managers concerned with knowledge flows have not traditionally involved themselves with seemingly irrelevant myths and gossip. Yet, as we have seen, stories are powerful conveyors of meaning and tacit knowledge. Most stories told informally in organizations are negative. Therefore, managers interested in how knowledge accrues in the organization cannot ignore these important transmitters. Stories that dramatize or illustrate managerial systems, values, and norms are more likely to be believed and acted upon than mere statements of policies and norms. Therefore, managers should mine organizational lore for stories that support the goals and mission of the organization.

Like mentoring, storytelling is an activity to be influenced rather than directly manipulated. One possible managerial behavior that follows from recognizing the power of stories is the *construction* of stories to make strategic points about an organization:

We can also use the ability of a good story to generate imitative examples to discover new knowledge and capability that we possess but do not use. The creation of scenarios based on this new view of reality will improve our forward planning and implementation. [45, p. 5]

We suggest that artificially constructed stories ultimately will be less effective than true ones. Employees are already frequently suspicious of management. Should word of the "created scenarios" leak out, that could itself become the basis of a story ("The Big Boss is human, all right—he lies") and fan the flames of cynicism. If the values and norms of the organization are truly held, there should be stories somewhere about behaviors that support those views. If there are only stories to the contrary, that is a strong message to management.

Finally, the insights from the literatures speak to the design and use of information technologies. While it is beyond the scope of this article to explore this issue in depth, some implications spring to mind. If stories are powerful in verbal form, their effect can be enhanced through the use of multimedia. Consistent with the elaboration effect, seeing and hearing the storyteller can add weight and detail to the story,¹³ as can visuals about the environment in which the story occurred. Information technologies

similarly can add power to mentoring. Simulations can extend the reach of the expert by providing opportunities for learning by doing in artificial environments. And computer systems can help the apprentice teach the novice (or the journeyman, the apprentice) by providing access to repositories of knowledge that may have little meaning to the uninitiated, but can be interpreted by someone with more experience. Information technology similarly is an indispensable tool for peer mentoring, as groups of physically dispersed individuals come together virtually to share knowledge in communities of practice.

Whether or not internalization and socialization are mediated with technology, managers are better equipped to build critical knowledge assets if they understand *why* and *how* people learn informally—not just that informal learning occurs. Moreover, the knowledge-sharing mechanisms of mentoring and storytelling can be enhanced by informed managerial action.

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NOTES

1. The initial report on this research appears in Leonard and Swap [21].

2. For Nonaka and Takeuchi, "First, knowledge, unlike information is about *beliefs* and *commitment*. Knowledge is a function of a particular stance, perspective, or intention. Second, knowledge, unlike information, about *action*. It is always knowledge "to some end." And third, knowledge, like information, is about *meaning*. It is context-specific and rational" [32, p. 58]. In their full definition, Davenport and Prusak observe that knowledge "provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms." [9, p. 5].

3. Interview with Fred Luconi by the two senior authors.

4. While "mentor" seems to have achieved general acceptance in this context, there is no commonly accepted term for the person being mentored. "Mentee" is contrived and can be confusing when used alongside "mentor," while "protégé" connotes a molding in the mentor's image, which some might resent. However, for purposes of this article, lacking a better term we defer to the generally used "protégé."

5. Self-selected mentor-protégé teams tend to be more effective than appointed teams [38]. However, since people tend to select individuals who are similar to themselves, formal mentoring programs are sometimes necessary in order to provide mentors to minority populations in the organization [37].

6. Kram [16] divides mentoring functions into Career Function (sponsorship, exposure and visibility, coaching, protection, challenging assignments) and Psychosocial Functions (role modeling, acceptance and confirmation, counseling, and friendship). Most of these functions channel information if not knowledge—but only a few of them do so directly. Although protégés certainly learn from exposure, challenging assignments, and confirmation, knowledge flows most obviously through coaching, role modeling, and counseling. Benabou and Benabou [3] divide mentoring functions into three: professional, political (which is subsumed in Kram's career function), and psychosocial.

7. Leonard-Barton [19] suggests four dimensions, only three of which are relevant here: critical skills, managerial systems, norms and values. The fourth is physical systems, in which knowledge can be embodied, for example, proprietary software or special equipment.

8. Not all supervisors regard themselves as mentors, and some researchers even have suggested that supervisors should *not* serve as mentors [16]. Still other researchers have found supervisors to be the best mentors [5].

9. Morrison [27] includes peer mentors in her study and found that newcomers were initially more likely to seek such information from peers than supervisors, but the difference disappeared by the second wave of research in the six months covered.

10. Although norms and values are similar concepts, they differ in important ways. *Norms* (standards for appropriate behavior) guide individual decisions within organizations. For example, norms can dictate how to dress, or what kinds of details are appropriate in product design. Norms can facilitate knowledge acquisition, for example, by providing guidelines for how knowledge should be shared across boundaries. Norms can also inhibit knowledge flow. For instance, an implicit norm of "Don't rock the boat" can discourage employees from taking risks by challenging accepted wisdom. *Values* are deeply held beliefs about what is of greatest importance to the organization. For example, the founders of Johnson & Johnson and Hewlett-Packard left a heritage of ethos that directs the companies' interaction with society even today.

11. It is certainly possible to imagine, however, a context in which critical skills *could* be transferred through stories, particularly when those skills are heavily laden with tacit knowledge. For example, the critical skills used by a psychiatrist or clinical psychologist to form relationships with patients might be transferred, in part, through stories told by experienced practitioners about their cases.

12. This example comes from the second author's consulting practice.

13. Part of the "HP Way" is to respect employees as individuals. When Hewlett-Packard decided not to offer benefits to partners of gay and lesbian employees, those employees felt there was an inconsistency with the core values of the company. Stories about the actual experiences of these employees were collected and presented before management at a "Reader's Theater." Confronted with this vivid narrative evidence, management reversed its decision [21, p. 70].

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