WHY ORGANIZATIONS DON'T "KNOW WHAT THEY KNOW": COGNITIVE AND MOTIVATIONAL FACTORS AFFECTING THE TRANSFER OF EXPERTISE

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In today's economy, competitive success is increasingly based on possessing knowledge and intellectual capital rather than financial or other "hard" assets. For instance, Grant (1996) has argued that knowledge is the most critical asset for a company, and Spender (1996) maintained that a firm's knowledge and its ability to produce knowledge was at the core of a theory of the firm. Nevertheless, the sharing of expertise within organizations remains a challenge for managers. As the former chief executive of Hewlett-Packard, Lew Platt, was quoted as saying, "If HP knew what HP knows, we would be three times as profitable" (Davenport and Prusak, 1998: xii; see also O'Dell and Grayson, 1998a).

In a recent surge of articles and books discussing the benefits of knowledge sharing and knowledge management, scholars and practitioners have argued that organizations can do more to capitalize on the expertise embedded within them. But, many organizations expend incredible efforts in an attempt to promote the sharing of expertise and nevertheless meet with little success. As an example, a survey of 431 U.S. and European organizations by Ernst and Young found that

only 13 percent of the respondents thought they were doing a good job at transferring knowledge held by one part of the organization to others in the same firm (Ruggles, 1998). Why is it so difficult to harness and disseminate knowledge and expertise?

In her recent book, Argote (1999) argued that there are conditions under which it is more difficult to learn and share knowledge within organizations. We agree with Argote and we take her premise one step further. In this chapter, we argue that there are deep-rooted *cognitive* and *motivational* limitations that interfere with peoples' ability to share their expertise. Our purposes are to highlight these limitations, to identify realistic expectations for what expertise will be shared and when that will occur, and to identify practices that may help managers improve the sharing of expertise in their organizations.

It is important to note that there is substantial evidence that sharing knowledge and expertise within organizations is problematic. For instance, there is case study evidence that General Motors learned surprisingly little from its joint venture in California with Toyota, even though it went into that venture with learning as one of the primary objectives (Brown and Reich, 1989; Pascale, 1990). General Motors also had difficulty transferring lessons from its experience in the Saturn division into the rest of the company (Pfeffer and Sutton, 2000). Quantitative data provide a similar picture of the difficulties of transferring knowledge and expertise. Szulanski (1996: 27), studying 122 best-practice transfers in eight companies, noted that "experience shows that transferring capabilities within a firm is far from easy." Data from a number of studies show that there is substantial variation in performance across sites in multi-site organizations, indicating that transferring knowledge and expertise is problematic. For instance, one analysis demonstrated that there was no organization-level effect on oil refinery performance (Ricketts, 1994)—in other words, there was as much variation in maintenance expenditures and

refinery uptime across different refineries *within* a company as there was across refineries owned by different companies. Other studies of the performance of units in multi-site organizations have reported similar results concerning the lack of an organization-level effect on performance (e.g., O'Dell and Grayson, 1998b). To have as much variation in performance across sites inside a single organization as there is across sites operating in different organizations clearly suggests that there is inadequate transfer of expertise occurring within organizational boundaries.

Cognitive Limitations

One set of limitations on sharing expertise is cognitive – that is, the way that experts store and process information may make it difficult for them to share that expertise with others regardless of whether or not they are motivated to do so. The cognitive limitations faced by experts come partly from the way that they mentally represent the task. As expertise increases, mental representations become more abstract and simplified (see Sternberg, 1997 for a review). For example, in a study of electronic repairmen, Gitomer (1984) found that those with more skill viewed the electronic device as a system of components and conducted trouble-shooting by following a conceptual model of the way the device worked. In contrast, those with less skill described the same device as a group of unrelated parts and spent more time switching parts using a trial-and-error procedure. Similarly, Chi and her colleagues (Chi, Glaser, & Rees, 1982) found that experts in physics used a deeper, more conceptual structure to sort physics problems whereas novices sorted problems using a superficial structure. Adelson (1984) also found that expert programmers used conceptually-based (abstract) representations when attempting to describe a programming task, whereas novices used syntactically-based (concrete) representations. These studies, along with others (i.e., Ceci, & Liker, 1986; Gobet & Simon,

1998; Johnson, 1988; Lamberti & Newsome, 1989; Chase & Simon, 1973; McKeithen, Reitman, Rueter, & Hirtle, 1981), suggest that expertise is characterized by conceptual, abstract representations.

One characteristic of experts' more conceptual, abstract representations is that they appear to be simplified representations of the task. As experts begin to automate aspects of the task, details of the task become less salient and experts begin to view the task in an oversimplified way (Langer & Imber, 1979). In an experiment, Langer and Imber (1979) found that experts' lists of task components contained significantly fewer and less specific steps than did the lists of those with less expertise. Developing abstract, simplified representations of the task allows experts to process information more rapidly, view the task holistically, and avoid getting bogged down in details. As such, abstract and simplified representations generally serve experts well. However, there are situations in which these representations can interfere with experts' ability to share their expertise, particularly with others who have significantly less expertise.

Bridging the Expertise Gap

When experts share their expertise with others, they are frequently in the position of communicating with people less expert than themselves. This requires that they somehow bridge the gap between themselves and those with less expertise. Experts can bridge the gap by providing background, concrete information, and using language that is understandable to those with less expertise. In other words, experts need to establish a common ground with the intended recipients of their knowledge. However, it can be difficult at times to determine what is common ground and to convey information appropriate to the recipient.

In conveying expertise to others, one might expect that experts would have the flexibility to revert to their concrete understanding of the task or to their own novice experience as a means of bridging the gap between themselves and novices. However, several cognitive limitations interfere with both experts' ability to access their expertise at the concrete level and their ability to articulate that expertise in such as way that those with less expertise can understand it.

In her study of experts' estimations of novice task performance using a cellular telephone (study 1) or building a toy airplane (study 2), Hinds (1999) found that experts severely underestimated novice performance times. In part, experts' inaccuracy was attributable to an availability bias – a bias whereby people recall information that has been more recently triggered or is, for other reasons, more salient in memory (see Tversky & Kahneman, 1973). To the extent that experts acquired their expertise at an earlier time than those with less expertise, they may have incomplete and inaccurate recall of their own learning experience because it is less available in memory. Experts, for example, have difficulty recalling how little they knew and how slowly they performed as novices (Hinds, 1999). Because experts begin to abstract and simplify their understanding of tasks as they become more expert, they may not be able to recall the complexity and details they and others require as novices to understand the task

Although little work has focused specifically on how experts share their knowledge, there is some evidence that experts' instructions to novices will be at a level too difficult for novices to grasp. For example, in an experiment in which electronics experts instructed novices on how to complete an electronic circuit, experts gave more advanced, abstract, and less concrete instructions to novices than did those with less expertise (Hinds, Patterson, & Pfeffer, in press). A second experiment then demonstrated that novices performed better on the target task when instructed by those with less expertise. Similarly, in a recent experiment by Finkel, Heath, and

Dent (2001) in which they asked participants to provide instructions on how to order a series of abstract shapes, participants with more experience providing instructions to a partner oversimplified their explanations and relied more on idiosyncratic language than did those with less experience explaining the task to others. These studies suggest that experts have difficulty reverting to concrete, detailed explanations of the task even when they know their explanations are intended for novices.

Camerer and his colleagues (Camerer, Weber, & Loewenstein, 1989) termed a related bias the "curse of knowledge" – a curse whereby those with knowledge are unable to forget their knowledge even when it would improve their own performance on a task. In their study of student project teams, they found that performers were unable to ignore their current knowledge when making estimates of company earnings. Further, when guessing the mean prediction of uninformed subjects, informed subjects estimates' were biased toward their own knowledge. The curse of knowledge may make it difficult for experts to bridge the gap between themselves and novices because they have difficulty imagining ever having been so ill-informed on the topic and accurately imagining the information that novices might not know.

When attempting to take the perspective of those with less expertise, experts may rely on an anchoring and adjustment heuristic, a method that involves establishing a baseline from which to adjust their estimates of others' behaviors. Often this baseline is derived from the estimators' own experience (Davis, Hoch, & Ragsdale, 1986; Nickerson, Baddeley, & Freeman, 1987). For instance, Hinds (1999) found that experts anchor on their own current experience and attempt to adjust downward to the level of those with less experience. When decision makers use an anchoring and adjustment heuristic, the adjustment is often inadequate, with the estimate too closely associated with the original anchor. Consistent with this, Hinds (1999) found that experts

attempted to adjust their original anchor (on their current performance) by adjusting downward to their own novice performance, but that these adjustments were sorely lacking because experts had inaccurate memories of their own novice performance. Experts may think that they are bridging the gap between themselves and novices because they have made a downward adjustment, but they fall terribly short. The result can be frustration on the part of the novice or, even worse, novices may have an incomplete understanding of the task without realizing it is incomplete. In these cases, novices may believe that they have the knowledge required yet find themselves unable to successfully complete the task.

The availability bias, the curse of knowledge, and an anchoring and adjustment heuristic all are cognitive heuristics or biases that are characteristic of how experts retain, process, and retrieve information related to their expertise. Each makes it challenging to bridge the gap between experts and novices. Moreover, these biases may be difficult to overcome. In their study of students estimating company earnings, Camerer, Weber, and Loewenstein (1989) found that feedback did not improve informed subjects' estimates of uninformed subjects' predictions. Similarly, in her work examining experts' estimations of the performance time of novices using cellular telephones, Hinds (1999) found that experts did not improve when prompted with traditional debiasing methods. Even when prompted to think about their previous experience and consider the types of problems faced by novices, experts had a difficult time including and weighting these factors appropriately. For example, when confronted with the problems faced by new users of cellular phones, one expert stated that these problems were easy to solve and should take mere seconds, although the novices struggled with the problem for several minutes (Hinds, 1999). These cognitive limitations suggest that even when experts are willing to share their knowledge with others, they may face the challenge of not being able to revert to a level of

concreteness and detail that is needed by novices to understand and build their own expertise at the task.

Articulating Tacit Knowledge

Another cognitive problem to transferring knowledge is the challenge of articulating knowledge that is tacit rather than explicit. As experts learn tasks, they develop both explicit and tacit knowledge. Tacit knowledge is learned through experience and held at the unconscious or semi-conscious level (see Polanyi, 1966; Leonard & Sensiper, 1998). Because tacit knowledge does not reside at the conscious level, it is difficult to articulate and, therefore, difficult to share with others. Even when experts are able to mentally bridge the gap between themselves and those with less expertise, they may have trouble articulating the specific information novices need to learn and perform effectively. In their study of pizza parlors, Epple, Argote, and Murphy (1996) found that workers acquired both explicit, codifiable knowledge and tacit knowledge. For example, one employee was able to share with others a system for optimizing pizza preparation based on the cooking times of different pizzas. However, employees had difficulty telling others how to hand toss a pizza because the expertise was tacit and not easily described. In such cases where expertise is tacit, people may inadvertently tell only part of the story – the explicit version – but neglect to share the more tacit foundation that makes the knowledge complete.

Another problem in asking experts to articulate knowledge is that knowledge is embedded and difficult to extract from the particular situation or environment (Brown & Duguid, 1998; Hansen, 1999; Lave & Wenger, 1991). Experts may be able to articulate the steps that they perform in their own situation, in their own environment. However, these may or may not

be the steps that are needed or the approach that is appropriate in a different environment. This phenomenon is so pervasive in organizations that the phrase "not invented here" has been coined to refer to ideas that were developed in a different context and are therefore less valued. While part of the resistance to adopting innovations that were invented elsewhere may be based on competition for status or the derogation of out-groups (e.g., Brewer and Brown, 1998), some of the problem may also be based on the genuine challenge of adopting innovations developed in a different context.

In their study of two truck assembly plants whose technologies diverged over time, Argote and Epple (1990) found that managers were reluctant to share knowledge, arguing that knowledge from the other plant was not relevant for their operations. Similarly, in their study of knowledge seeking and sharing within a consumer products organization, Hinds and her colleagues (Hinds, Burgess, Pfeffer, & Moore, 2001) found that employees were more resistant to sharing knowledge that required adaptation to a new context. This is consistent with Singley and Anderson's (1989) model of transfer which argues that transfer of knowledge will be greater if there is more similarity between tasks. Singley and Anderson go on to argue that negative transfer can occur when people attempt to transfer knowledge between tasks when the conditions do not match. This is not to say that expertise cannot be applied across situations, rather to point out the added challenge faced by experts when attempting to codify or articulate knowledge in such a way that it can be applied across multiple situations and in multiple environments.

Finally, there is some evidence that when experts are exhorted to explicate their knowledge, it can detract from their own performance. In the process of explicating knowledge, experts may get unduly committed to the partial knowledge that they have articulated and neglect more subtle, tacit aspects of their tasks. Work by Wilson and Schooler (1991) suggests that being

asked to explain what one is doing makes people less effective at performing tasks because it requires that they explicate a plan of action that does not reflect what they would have done if they had relied on their tacit knowledge. In asking experts to convey their knowledge, it may be wise to be cognizant of the potential drop in experts' level of performance if asked to explicate their expertise at a detailed level. The risk is that experts may become more distant from their own expertise as they focus on the details important to novices.

Motivational Limitations

Although the cognitive factors previously discussed are important in understanding why knowledge and expertise are sometimes difficult to communicate and transfer, cognitive limitations are not the whole story. Differences in perspective between experts and novices, and even the effort required cannot completely account for the profound problems observed in the transfer of knowledge and skill across units. In thinking about the challenges faced by organizations such as General Motors that have benefited little from efforts designed to increase learning across organizational units, it is clear that there must be some motivational, intentional component to the explanation. It is difficult to believe that individual cognitive biases such as an availability bias would differ substantially across companies, even though some organizations have much more success in transferring knowledge across units than others (Davenport and Prusak, 1998). This is not to deny the importance of cognitive issues, but to note that there are motivational problems as well.

Competition as a Disincentive

Much, although not all, of the motivational problem comes from the very structure and operating premises of most organizations, which are designed to set people and units against each other and thereby discourage the sharing of information and expertise. In ways too numerous to completely detail and so automatic as to be unexceptional, companies set up internal competitions that pit people and units against each other. People compete for promotions, and, indeed, promotion has been studied as a "tournament" in which people who win at one round survive to compete in the next round while those that lose are essentially finished in their efforts to win subsequent promotions (Rosenbaum, 1979). Economists have even argued that this tournament structure is desirable in ensuring effort and diligence (e.g., Lazear and Rosen, 1981). People also compete for raises. The customary way of administering salary is to distribute a fixed proportion of a unit's salary budget to be divided across the members of the unit based on relative performance. By definition this means that what one person receives another cannot, a zero-sum game. Companies offer individual incentives such as awards (like employee of the month or the year) or incentives to teams, such as bonuses or profit sharing. Although perhaps unintentional, such individual and team level rewards can induce competition because outstanding performance is most often determined *relative* to the performance of others.

Even without such explicit management practices, competition between units may be an inevitable aspect of organizational life. A natural (and often beneficial) result of being organized into units or teams is the tendency for individuals to "identify with" the team. People see themselves as part of their unit or work team and begin to differentiate themselves from other work teams. According to social identity theory, individuals' desire for positive self-evaluation

leads them to have an in-group bias in which they attribute more positive characteristics to their own group and negative characteristics to the "out-group" (Abrams & Hogg, 1990). This categorization process results in higher levels of intergroup conflict and reduced cooperation within organizations (Kramer, 1991). Argote (1999) argued that:

> Giving groups distinct names, providing opportunities for members to interact, publicizing the performance of different groups, providing rewards based on the performance of different groups, and other techniques designed to increase group identity are also likely to increase intergroup competition. Intergroup competition, in turn, impairs sharing of information and transfer of knowledge across groups. (p. 177)

Consistent with this, Fisher and his colleagues (Fisher, Maltz, & Jaworski, 1997) reported less information sharing between the marketing and engineering functions when respondents from the marketing side were more strongly identified with their group than with the organization as a whole. In other words, the very practices that promote high levels of *esprit de corps* within teams creates competition between teams and can inhibit the sharing of expertise within organizations.

Competition between individuals and teams is presumed to motivate greater individual or subunit performance. Holding aside whether or not inducing competition actually has such a desirable effect on individual performance (see Kohn, 1992, for evidence that competition does not invariably promote enhanced individual performance), competitive dynamics must inevitably produce less cooperation across people and units in a company. In the case of knowledge sharing or transferring expertise, there exist knowledge markets (Davenport and Prusak, 1998) inside organizations and, like any other markets, exchange dynamics are important. For experts, the cost of sharing expertise in a competitive environment generally outweighs the benefit of

sharing. Why would I voluntarily help a competitor—for raises, for promotions, for status—in a system that induces more competitive dynamics? The answer is, I would not. Another way of seeing the same result is to note that knowledge is power, and control over information provides those that have the information, if it is necessary and useful, with more power (e.g., Pettigrew, 1972). Sharing expertise, therefore, means sharing power—and one is much less likely to share power in a competitive environment in which those who are receiving the information and expertise may use it against the interests of the person providing it. This logic is why Deming and other writers about total quality management, a process that relies heavily on learning from others to improve operations, were so critical of relative performance evaluations and any other management practices that set people against each other (e.g., Deming, 1982).

Consider also the person on the other side of the exchange—the person in need of the knowledge or expertise. As Blau (1956; 1964) showed decades ago, status is accorded to those who provide assistance to others. The providing of status to the helper balances the exchange. If the helper did not receive higher status, then the exchange would be unbalanced—the requestor of help would get the help, and the person providing the information would get nothing. In a competitive world, an individual in need of expertise may be reluctant to voluntarily engage in an exchange—knowledge for status—that places them in a disadvantageous position and acknowledges their inferior position. However, status is not the only exchange that can be offered. Within organizations there exists a *norm of reciprocity* such that asking for knowledge from others implies the expectation of reciprocation in the future. In an organization in which knowledge is considered to be the property of an individual and obligations are incurred when knowledge is sought, people should be more reluctant to seek knowledge and expertise from others (see Hollingshead, Fulk, & Monge, in press). Consistent with this, Hinds et al. (2001)

found that within a consumer products organization, respondents who reported that norms of reciprocity were operating also were significantly less likely to spend time seeking knowledge from others in the organization.

If inducing competitive dynamics impedes the transfer of expertise within organizations, then it must follow that eliminating the emphasis on internal competition is an important step in enhancing knowledge transfer. Anecdotal, case evidence suggests that it is. Davenport and Prusak (1998) noted that companies that were most successful in knowledge transfer had both formal and informal reward systems that provided recognition, status, and even material rewards to those who shared expertise and helped others, not to those who developed and maintained knowledge monopolies. They maintained that creating situations where people would feel motivated to share their wisdom with others required that "organizations…hire nice people and treat them nicely" (p. 34).

Other Disincentives

In addition to competition, other organizational processes also can act as disincentives for sharing expertise. For example, some organizations insist on "knowledge sharing" by establishing explicit, formalized processes that require the sharing of expertise. These processes are designed to ensure compliance and conformity. However, because knowledge sharing requires the transfer of knowledge across boundaries along with the development of a shared understanding of the material (see Brown & Duguid, 1998), ideal information sharing processes allow relationships and shared interpretations to develop with less rigid organizational control. In systems constrained by rules, experts may be less motivated to share their expertise because the process is less satisfying. In fact, reactance theory (Brehm, 1966) suggests that forcing

people to do something may produce exactly the opposite result, as people rebel against the constraints imposed on them.

A related organizational characteristic that acts as a disincentive to sharing expertise in organizations is the status hierarchies that are pervasive in organizational life. Formal hierarchies have traditionally served the purpose of coordinating and making more efficient the flow of information in organizations (Aldrich, 1979, Cyert & March, 1963, Simon, 1962). This is accomplished through a division of labor in which functionally specialized units and unity of command constrain communication flows to those defined by the chain of command (Galbraith, 1973). By constraining communication so that instructions flow downward and information flows upward, organizations are made more efficient and predictable. However, people who are accustomed to such a model may be reluctant to share information in ways that violate this model. For example, Leonard and Sensiper (1998) describe the situation of nurses who are reluctant to suggest patient treatments because physicians are of higher status. Similarly, in a study of operating room teams, Edmonson (2000) reported that nurses and others of low status often were reluctant to share their expertise and advice with surgeons because surgeons responded negatively to advice from these lower status team members. In some cases, this resulted in errors in the operating room because the lower status team members frequently better understood some aspects of the new technologies and procedures. Sanctions against sharing and norms for not sharing across hierarchical boundaries conspire to limit the amount of expertise that flows upward and even laterally inside organizations.

A somewhat related yet distinct motivational issue is the individual's relationship to the organization, not just to others inside the organization. Being motivated to share what you know with others requires trust—not only trusting those others (something that is diminished with

competition), but also trusting the larger institution within which the sharing of expertise is occurring. "Workers are more likely to…expend the additional effort to gather and share information… when their claims to be stakeholders are recognized by the firm and they have a reasonable expectation of employment security" (Appelbaum, Bailey, Berg, and Kalleberg, 2000: 43-44). In this regard, there is evidence that organizational actions that destroy trust, such as downsizing, induce fear and make the transfer of expertise and experience less likely (Davenport and Prusak, 1998; Pan & Scarbrough, 1999; Pfeffer and Sutton, 2000). For example, in her study of a groupware system, Orlikowski (1993) observed that people were reluctant to share information when they were afraid that the information would be used against them. Pan and Scarbrough (1999) also observed that an environment of trust contributed to active knowledge sharing within a multinational chemical company. Why would someone tell what he or she knows, unless the person feels reasonably secure that by sharing knowledge they are not putting at risk their or their colleagues' organizational position and career?

Leonard and Sensiper (1998) go on to argue that sharing one's expertise can be risky because of the difficulty involved in articulating preferences based largely on tacit knowledge. For example, in designing computer interfaces, some experienced user-interface specialists simply "know," but cannot explain why the buttons should be placed in a certain configuration or the colors should be changed on a computer screen. In organizations that insist on hard data, sharing one's tacit expertise via opinions and intuitions can convey a lack of certainty or clarity and undermine one's expert standing in the organization. Sharing expertise requires building a culture of trust, and any organizational practice or action that destroys trust adversely affects the motivation to share information with others.

Lack of Incentives

Competition, rigid business processes, and status differences within organizations can act as disincentives to sharing one's expertise. In addition to organizational practices that create penalties for sharing expertise, organizations can (and often do) inhibit the sharing of expertise by not providing adequate incentives to balance the costs experts invariably incur in the process of sharing their knowledge. Sharing complex knowledge requires time devoted to either personal interaction, thoughtful documentation of one's expertise, or both. Few organizations provide the time required for knowledge transfer, believing that "conversations" are not real work. As Davenport and Prusak (1998: 47) have noted, "Implicit in building a marketplace…is the need to give members of the organization enough time to shop for knowledge, or to sell it. A Catch-22 of the corporate world is that employees are too busy working to take time to learn things that will help them work more efficiently."

Consistent with theories of motivation, people can be expected to share their expertise more when they are provided incentives for doing so (see Huber, 1991; Pan & Scarbrough, 1999). The importance of receiving credit for knowledge sharing was evident in an interview reported by Hinds and her colleagues (Hinds, et al., 2001) in which a director from a consumer products organization said: "We are so focused on results and we are measured on results… and nowhere, anywhere, does it say you should share knowledge, help other people with the knowledge you have and you will be rewarded for it… I won't make more money by sharing more and I won't get promoted by sharing more." However, when there was a reward for knowledge sharing, it occurred. Within one division of the same consumer products organization, an award was offered for "information sharing." One director singled out the

people in this division as “doing a great job” because they were actively talking to others in the company and sharing knowledge across divisional boundaries.

In his study of the search for knowledge and transfer of expertise within an electronics company, Hansen (1999) found that personal contact that allowed for questions and feedback resulted in more successful transfer of knowledge, particularly tacit knowledge. However, such interactions frequently require patience and effort as the expert attempts to understand the novice perspective, answer questions, provide feedback, and convey knowledge successfully. An alternative to personal contact is the documentation of experts’ knowledge. However, this process also can be onerous and time consuming for the expert. On software development projects, developers are often reluctant to spend hours documenting their code so that others can benefit from their expertise. One reason for developers’ reluctance is undoubtedly the lack of incentives for such time-consuming tasks. Knowledge transfer, in other words, requires resources of time and energy. Too many companies want to see a return on their investment in transferring skill and knowledge without making the investment and adequately compensating employees for their time.

Overcoming Barriers to Transferring Expertise

Our discussion of the cognitive and motivational limitations to sharing expertise paints a pretty dismal picture with regard to sharing expertise within organizations. However, many organizations have successfully shared and transferred expertise between units (see Argote, 1999 chapter 5). Although some of the cognitive and motivational limitations that we discussed earlier are extremely difficult to overcome, we believe that there are some management practices that can be implemented to diminish the problem of transferring skill and knowledge.

Overcoming Cognitive Limitations

Cognitive limitations may be more difficult to overcome than motivational ones because the limitations are a result of the way that information is stored in and retrieved from memory. Still, there are some things that organizations can do that may reduce the effects of these cognitive factors. For example, many of the cognitive limitations apply to experts but less so to those with less expertise. Organizations might, therefore, find more success in disseminating expertise by using people with an *intermediate* level of knowledge as a conduit to transfer information between experts and novices. Some research suggests that those with intermediate levels of expertise may be better suited to sharing expertise with novices because they are closer to the novices' own experience. For example, Hinds (1999) found that those with intermediate levels of expertise were better predictors of how long it would take novices to perform tasks using a cellular telephone than were either experts or novices. Those with intermediate levels of expertise may be able to explicate more of the concrete knowledge required for the task than experts while still providing the abstract information required for task understanding. Organizations might also consider creating teams composed of both intermediates and experts to help provide information to novices at the appropriate level of complexity.

Another way to overcome some of the cognitive limitations is to encourage two-way interaction between novices and experts. This allows novices to ask questions and get feedback from experts. It also allows experts to adjust their presentation style based on novices' questions and performance. One form that such an approach can take is an apprenticeship program in which novices are able to shadow experts and ask questions without relying solely on experts to explicate their knowledge. Such a process puts the burden on the novice to understand the

experts' context and to ask the questions that make it possible for novices to transfer this knowledge to their own situation. This process has characteristics similar to that described by Hansen (1999). In his study, strong interpersonal relationships that allowed discussion, questions, and feedback were an essential aspect of the transfer of complex knowledge.

Carlile and his colleagues (Carlile & Rebentisch, 2001; Carlile, in press) have argued that they key to overcoming contextual differences is by representing knowledge through the use of boundary objects. Boundary objects embody and represent essential knowledge and can be shared across domains and levels of expertise. For example, experts can produce prototypes or sketches of products as a way of conveying their thoughts about how a product might work and how it should be designed. The prototype has extensive tacit knowledge embedded within it and can serve as a basis for communication, discussion, and elaboration without requiring that the expert articulate *a priori* all of his or her thinking about the product design. Through such boundary objects, people can see for themselves the way that knowledge is represented and negotiate shared meanings.

Overcoming Motivational Limitations

Fortunately for organizations, motivational barriers to sharing expertise are more easily addressed through changes in organizational practices. The motivational issues discussed above can be addressed by reducing competition between groups, allowing communities of practice to evolve, de-emphasizing status hierarchies, and increasing incentives to share expertise with others.

Organizations can do several things to reduce competition between groups. First, encouraging individuals to focus on organization-level goals rather than individual or team-level

goals can reduce intergroup competition by causing employees to identify with the organization as a whole (e.g., Sherif, 1966). In Sherif's classic studies of interaction in a boy's summer camp, when groups competed with each other, the boys exhibited hostile behavior. However, when they were given a superordinate goal, competing with another camp across the lake, they were amicable towards each other and exhibited cordial, friendly relations. These results, replicated numerous times experimentally, demonstrate that "there is usually more ingroup bias, less intergroup liking, and greater intergroup discrimination when groups are objectively in competition than when they are interdependent or must cooperate to achieve a common goal" (Brewer and Brown, 1998: 565). Once individuals identify with the organization and see those outside as the competition, the sharing of expertise should increase.

Second, organizations can reduce their reliance on individual and unit-level reward systems that are zero-sum. For example, organizations can allocate raises based upon absolute levels of performance (e.g. against goals) without ranking employees and teams against one another. They can also avoid zero-sum situations where an increase in one person's raise precludes an increase in another person's raise by setting aside enough resources so that all employees can receive the highest possible raise if the company does well as a whole. Further, to promote high levels of cooperation, a significant portion of an individual's compensation can be based on the performance of the organization rather than on the performance of the individual or team. Such organization level reward systems can be used for salary increases, bonuses, stock options, and so forth. Reducing competition between groups and focusing individuals on collective goals should increase peoples' willingness to share their expertise with others because all parties benefit from the exchange.

Another method for increasing the sharing of expertise within organizations is to encourage and support "communities of practice." Communities of practice are "groups of people who are informally bound together by shared expertise and passion for a joint enterprise" (Wenger & Snyder, 2000: 139). These groups tend to interact regularly by meeting face-to-face or relying on technology to facilitate discussion. Members belong to communities of practice because of a desire to exchange knowledge. Organizations can promote communities of practice by creating an organizational environment in which these informal groups can thrive. Wenger and Snyder (2000) describe communities of practice as gardens that need to be tended and nurtured. To the extent that organizations nurture those communities of practice that are keepers of knowledge critical to the mission of the organization, essential expertise is likely to be shared more readily across organizational units.

Another motivational limitation discussed above is the status hierarchy that exists within most organizations. To the extent that organizations de-emphasize status distinctions, there is likely to be more sharing of expertise. For example, if nurses felt that they were valued as much, or almost as much, as the physicians, they would be more willing and able to share their expertise about a patient's history or the new technology. Managers can de-emphasize status by reducing the power differential between members of the organization. In the case of nurses and physicians, if physicians had no influence over the schedules, assignments, and careers of nurses, the power differential would be reduced (though unlikely eliminated because of other contributors to status such as level of education). Another way to reduce the negative effects of status is to elicit and encourage minority opinions. If people feel that they are appreciated for their new perspective rather than sanctioned for unpopular opinions, they are more likely to risk

sharing their expertise even if they are of lower status or have opinions different from those of others.

Finally, increasing the incentives for sharing expertise should help to off-set the costs that experts incur when they take the time and put forth the effort to share their expertise. Although some organizations provide incentives for sharing expertise, rarely are these incentives comparable to incentives for completing other tasks within the organization. People often work to product or project deadlines and are rewarded based on their performance against these goals. To the extent that sharing one's expertise is at least as valued and rewarded as other goals, sharing expertise is likely to be increased.

The Role of Technology

So far, this chapter has avoided the question of how technology can help to facilitate the sharing of expertise within organizations. The reason for this is two-fold. First, the focus of the chapter was intended to be on limitations to the sharing of expertise as a backdrop for understanding organizational processes around the sharing of expertise. Second, the authors are somewhat skeptical about the role of technology in facilitating the sharing of expertise.

We believe that expertise is largely tacit and embedded in the context in which it is being used. Systems that purport to capture expertise for later perusal by those in need often fall short of the goal. This is in part because it is difficult to capture the knowledge of experts in such a form and in part because users find it difficult to absorb expertise from such a system. As we discussed, experts' ability to explicate their tacit knowledge is limited by the way they represent their knowledge in memory. This not only interferes with their ability to articulate this knowledge to novices, but makes it difficult to articulate it in such a way that it can be loaded

into an information system for later retrieval. Further, experts are unlikely to be motivated to document their knowledge for others to use. For these reasons, our assessment is that these systems generally capture *information or data* rather than *knowledge or expertise*. Information and information systems are extremely useful, but do not replace expertise or the learning that takes place through interpersonal contact.

One promising technological development is in the area of "expert finding" systems – systems that are available to organizational members who want to find experts on particular topics. These systems have the advantage that they are not attempting to disseminate disembodied, decontextualized knowledge, but are trying to facilitate the development of interpersonal connections around topics of interest. Although a new set of organizational issues arise with the introduction and use of such systems, we believe that being able to locate those with expertise is an important step in building interpersonal ties and communities of practice through which expertise can be shared.

Conclusion

It is generally recognized that in today's economy, it is increasingly the case that all work is knowledge work. Therefore, what the barriers are to developing and transferring expertise within organizations, and the ways of overcoming those barriers, are of interest to both organization theorists and to practicing managers. We have argued in this chapter that: 1) sharing knowledge even within an organization is often difficult and not always successfully accomplished; 2) this difficulty arises from a set of both cognitive and motivational issues; 3) organizations that successfully transfer knowledge and share expertise are better at building

structures and sets of management practices that overcome these barriers; and 4) in all of this, technology may play an enabling role but is not a critical factor either in the origination of the cognitive and motivational problems or in their solution.

Throughout, we have tried to tie the issue of sharing expertise to some fundamental features and literatures in both cognitive psychology and organization theory. By so doing, we hope to encourage more research that crosses disciplinary boundaries and that investigates the causes of the problems in sharing expertise and their remedies from multiple perspectives.

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