

Transferring Expertise in Startup Companies: Forlorn Hope?

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Abstract

A review of the literature on transferring expertise reveals that the task is daunting. The very nature of expertise is that it develops over a period of many years, primarily through experience and learning by doing. Yet in the complex, knowledge-intensive field of entrepreneuring, as in athletics, coaches are employed to attempt to speed the learning process for novices.

The authors draw upon a two-year, international study of startup companies to illustrate the modes of knowledge transfer employed by venture capitalists and so-called “mentor capitalists” (experienced entrepreneurs engaged as mentors for startup CEOs) and to demonstrate both the value and the limits of such coaching.

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Introduction

At the end of the 20th century, an enormous business experiment swept much of the world: the Internet. Companies sprang up around the world to take advantage of this accessible, flexible technology. For a few years entrepreneuring became a wildly popular career aspiration. Students at the most prestigious business schools were leaving before earning their degrees, believing they had to seize the moment to strike it rich in the so-called “New Economy.” Already wealthy young entrepreneurs were leaving millions in unvested stock options behind to found companies they believed would provide them with “plane money,” i.e., enough to *buy* a private jet. One 20-something tyro was quoted as saying that you weren’t even a player in Silicon Valley with less than \$100 million.ⁱ However, it soon became apparent that while ideas were plentiful and ambitions high, knowledge about the art of transforming ideas into businesses was in short supply. As a result, little-publicized partnerships began to flourish between two kinds of knowledge worker. On the one hand were the coaches: venture capitalists and “mentor capitalists” (smart angels) who had experience in building businesses from scratch, but whose understanding of the commercial potential of the Internet was limited. On the other was the startup founder: a technologist or marketer who knew as much as anyone about exploiting the Internet, but knew next to nothing about building a company. As one startup coach we interviewed remarked of these young entrepreneurs, “They know the technology but they don’t know anything about building an organization, managing an organization, marketing, finance, you name it – they don’t know anything.”ⁱⁱ

So the new entrepreneurs needed coaches, and the venture and mentor capitalists wanted in on the treasure hunt. Thus began these complementary partnerships. The coaches took on entrepreneurial novices, providing advice ranging from the essentials of building a business—strategic positioning, product development, marketing, finance, recruiting, and so forth—to the interpersonal skills needed to manage boards, investors, and employees. For their part, the novices hoped that the knowledge they received would be sufficient to put their company on a track that was faster than the competition’s. All this occurred during a time of great uncertainty. The venture and mentor capitalists had gained their prior experience primarily in bricks and mortar or computer hardware businesses, in which building up intellectual property and turning a profit were essential. How different this was from the heady days of the Internet gold rush, when not only were the experts challenged by the novice entrepreneurs, but they themselves were uncertain about how much of their knowledge applied to the New Economy. Was the hot, fundable model business-to-consumer? Business-to-business? Business-to-enterprise? Where did profitability fit in, if at all? And what about these crazy high valuations?

This uncertainty caused almost everyone to question the wisdom of the experts from the universe of bricks and mortar—including the experts themselves. The respondent quoted above was humble about the limitations of his expertise in the New Economy—or perhaps just beaten down: “I was on the attack for a long time, and I finally just had to say, okay, if we’re going to go into e-commerce, I’ve got to just get my head into the same mode as all the other guys out there, where it’s a whole new game.”ⁱⁱⁱ

All the coaches tried to convey the essentials of building a business; however, they interpreted that mandate differently. Some stuck to the fundamentals of business: strategic positioning, product development, marketing, finance, building an organization and so forth. Others took on an additional and far more personal role: that of self-development mentor, helping the entrepreneur learn generic interpersonal skills and serving as a mirror in which the entrepreneur could see her own personal development as a leader.^{iv} In this paper, we do not distinguish between those different types of knowledge content. Rather we address the fundamental process of knowledge transfer, regardless of the content of that knowledge, and focus on two major questions that confronted the new breed of entrepreneur entering into a partnership with an experienced coach: First, to what extent was the coach’s expertise relevant in the New Economy, where the old rules seemed not to apply? And second, even if it was relevant, could the expertise be transferred—and transferred fast enough—for the new entrepreneur and his company to be competitive when everything was moving at “Internet speed”?

As noted below, the advent of the “new economy” provided an unparalleled opportunity to view knowledge exchange as well as knowledge in the making. The questions specific to the entrepreneurial scene had their roots in more generic ones: what are the potential limits to expertise, given that it is based in experience? What modes of knowledge transfer are most effective?

Study Background and Data Sources

The field research from which this paper draws illustrations was carried out over two years in multiple locations. We conducted semi-structured interviews with pairs of people associated with 36 startup companies: a company founder and a startup coach, i.e. a venture capitalist, mentor capitalist, or founding partner of an incubator. Interviews were conducted in 2000, with follow-up interviews approximately one year later. Sixteen of the companies were in California (including one headquartered in Colorado but coached from California); six were in the Boston area, six in East Asia (Hong Kong, Singapore, China) and eight in India (Bangalore and Delhi). In addition, we wrote in-depth descriptive cases of three of these companies at a single point in time: one case for each type of coaching relationship. Two of the companies were studied longitudinally, including observations of board meetings during their first six months of existence and periodic interviews with company executives and coaches for 18 months thereafter. We also interviewed 32 “informants”—people not directly associated with the 36 companies, but whose observations of the general entrepreneurial climate provided valuable perspective. Over the course of the study, which straddled the boom and bust of the dot-

com bubble, five companies went out of business (four of them associated with incubators) and four were acquired. Six coaches left the companies during the study (four of them incubator coaches), and nine of the original founders were either removed from operations or had their role changed significantly. ***From an academic point of view, the timing of the study was fortuitous. In little over a year, startups went from being the icons of the American Dream to symbols of greed, excess and naiveté. As a consequence of the precipitous downturn in the economy, companies underwent rapid changes that in quieter times might have spanned years. The nature of the knowledge provided by coaches shifted radically from a focus on growth to one on preservation and husbanding of assets. It was a very rough time for those involved. For observers on the sidelines, it was a grand, if painful experiment in the ability of individuals to rapidly adjust and learn from experience.

The level of expertise among our respondents at the time of the study varied greatly. While most of the company founders were first-time entrepreneurs, some were serial entrepreneurs founding their second or third company. Most of the companies were raw startups, but several had been in existence for as many as ten years, so their founders were correspondingly more experienced. Similarly, the expertise of the coaches ranged from very experienced venture capitalists and mentor capitalists who had coached 60 or more prior companies, to incubator founders whose sole experience in startups was in the founding of the incubator itself.

The study of the nature of expertise has a long history in psychology and cognitive science. However, there have been few attempts to relate these research findings to expertise in developing businesses. In order to make these connections and to suggest their managerial implications, we turn to some of the cognitive science literature on the nature of expertise. We will first consider what distinguishes an expert from a novice, apprentice, or journeyman, then discuss how one becomes an expert. Finally, we will consider how expertise may be transferred, and what the limitations are on that transfer.

What do we mean when we describe someone possessing “expertise,” that is, consistently superior performance in a complex field of study? Various writers^v think of expertise in terms of a progression. For example, Dreyfus and Dreyfus^{vi} describe five stages, from novice through advanced beginner, competence, proficiency, and expert. In our research, we have used just four, reflecting the medieval guild model: novice, apprentice, journeyman and master. (Of course, each of these could be further subdivided, perhaps yielding a continuum from “Raw Recruit” to “International Master Virtuoso.”) We have retained some of this vocabulary in thinking about expertise today. In the complex domains of chess and bridge, for example, we speak of grand masters, who are expert in all phases of the game. Well-traveled but inexpert ballplayers are called “journeymen.” For simplicity, in this paper we will generally refer to the entrepreneurs beginning new businesses as “novices,” and to their coaches as “experts,” realizing that some of the entrepreneurs may have considerable prior experience and some of the coaches may have limited expertise.

Finally, we recognize that domains vary considerably in terms of their complexity. Some domains, such as bridge, are more narrowly defined, so that expertise may be attained in all phases of the game. In certain physical domains, such as baseball, it is virtually impossible for even the supremely gifted to achieve expertise in hitting, fielding, and pitching. And entrepreneurship, which involves financial, strategic, marketing, and interpersonal management skills, among others, is beyond any one man's or woman's ability to fully master, and hence to transfer to a novice.

There are at least four characteristics of true expertise, and the nature of each of these characteristics places limits on the capacity for the expertise to be transferred.

The Nature of Expertise (1): Pattern Recognition, Rules of Thumb, and Context

Experts are sensitive to and can recognize meaningful patterns in a sea of information (“I’ve seen something very much like this before”). While pattern recognition largely guides the decisions of experts, novices rely more on memorizing rules of thumb (“When faced with situation X, do Y”). Research on chess players, for example, shows that after very brief visual exposure, experts could reconstruct meaningful middle-game positions much faster and more accurately than less skilled players could. Simon and Chase estimated that chess experts retained over 10,000 patterns in their heads, which then served as retrieval cues for appropriate moves.^{vii} Later research raised this number to between 100,000 and more than a million.^{viii} Novices, on the other hand, rely on rules of thumb such as “control the center” and “castle as soon as possible.”

Not only do experts recognize patterns, but they also “conditionalize” the knowledge—that is, they integrate the patterns with information about the context, resulting in a superior choice of action because it is contingent on variations in the situation. In our study, we found experts using both rules of thumb and pattern-recognition in making decisions and in advising the novice entrepreneurs. For example, coaches will often urge their charges to “Focus, focus, focus.” However, unlike the novices, experts realize when exceptions must be made, that such general rules don’t fit every situation. When, for example, would focusing exclusively on one particular market be premature? Only the expert recognizes the context, the pattern that directs the application of the rule—or suggests exceptions.

This ability to recognize and evaluate patterns is illustrated in the following description by one of the expert entrepreneurs we interviewed for this study:

You have these models that 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 nonpolitical.... Entrepreneurs confuse people

who are interested [in their products or services] with people who actually put down money and buy....After awhile, you say about a given situation: "that's going to be one of these." ...You can project what's going to happen. You have to have lived through all of those to have a gut sense of which things have a chance of succeeding, which are going to be difficult and which are impossible. If you don't have [a mental] model, you don't have a framework to react instinctively. You have to be careful to make sure your models are up to date and they are still relevant....But the more you see, the more it's the same....There are differences, clearly--that's what makes it interesting....But there are an awful lot of [familiar] dynamics going on.^{ix}

Another senior entrepreneur explains how he communicates his knowledge by drawing on his past experiences, even though those experiences may only be somewhat similar to the present situation:

You don't come in with a set of rules and say, "In this situation here's the set of facts so therefore rule number three applies, you should do this, you should do that." Because nothing is ever that cut and dried and in fact it would be deadly in some cases....because a director [of a company] ...doesn't really experience what the company is experiencing. There is just no way unless you're doing it to understand the whole context of where the company is at any given point in time. So if a director comes in and says, "Well, okay, I have this sort of very filtered view of what you guys are doing and I have now processed it through my experience and I have decided the right thing for you to do is XYZ," he's taking a real chance, because everything is different. There are no two things that are ever the same. So...my style is to simply say, "Well let me throw out something that you might find resonant with this particular context. I don't know, it seems to me like it does, but you guys are closer to it than I am. Let me tell you a story about XYZ." And then I'll do the context and try to sort of paint the story and then say, "Here was the situation and we decided to do thus and so for these reasons. And here's what happened (either it worked or it didn't work out). To the extent this seems applicable to our situation, you might want to weigh it with all the other factors under consideration."^x

Pattern recognition as a hallmark of expertise has important implications for the transfer of that expertise. The master has a vast storehouse of patterns upon which to draw; those patterns that guide expert decision making are hard earned over a long period of time, and there is no apparent way to "download" those hundreds or thousands of patterns to a novice.^{xi} Furthermore, an expert communicating pattern recognition to a novice does so only when a current situation is evocative of one of those patterns. There is no lexicon of patterns that the novice can study, like a quarterback poring over his football team's playbook. Even if there were, the patterns in such a "playbook" would be void of context, with questionable relevance to the current situation. This is why experts

often rely on transferring rules of thumb—shorthand, de-contextualized statements that summarize a great many patterns into one simple, memorable—and *usually* reliable—rule.

The Nature of Expertise (2): The Tacit Nature of Expert Knowledge

Experts are not always able to articulate their reasoning, since it is not a linear process of logically connecting a string of assumptions, causes and effects, but a recognition of a familiar, holistic system. Dreyfus and Dreyfus discuss how novices focus on “context free features”—rules of thumb that ignore variations across situations—while more advanced learners increasingly take context into effect, assessing the relative importance of competing priorities, and relying on tacit, intuitive aspects of their knowledge to make decisions.

What should stand out is the progression *from* the analytic behavior of a detached subject, consciously decomposing his environment into recognizable elements, and following abstract rules, *to* involved skilled behavior based on an accumulation of concrete experiences and the unconscious recognition of new situations as similar to whole remembered ones. . . . [T]he novice and advanced beginner exercise no judgment, the competent performer judges by means of conscious deliberation, and those who are proficient or expert make judgments based upon their prior concrete experiences in a manner that defies explanation.^{xii}

Thus, expertise has many tacit dimensions that are hard to separate from the person. Consider the following example of an expert firefighter confronting an unusual fire.

It is a simple house fire in a one-story house in a residential neighborhood. The fire is in the back, in the kitchen area. The lieutenant leads his hose crew into the building, to the back, to spray water on the fire, but the fire just roars back at them.

“Odd,” he thinks. The water should have more of an impact. They try dousing it again, and get the same results. They retreat a few steps to regroup.

Then the lieutenant starts to feel as if something is not right. He doesn’t have any clues; he just doesn’t feel right about being in that house, so he orders his men out of the building. . .

As soon as his men leave the building, the floor where they had been standing collapses. Had they still been inside, they would have plunged into the fire below.^{xiii}

In Gary Klein’s study of expert decision making from which this example is drawn, the lieutenant attributed the close escape to “ESP” or a “sixth sense.” However, after persistent questioning and analysis, it became clear that he had actually recognized a

number of key aspects of the fire that led him to the decision to evacuate his team quickly. For example, the room was hotter than he would have expected from a small fire; and the fire was very quiet. He “intuitively” concluded that there must be an unsuspected basement beneath the living room, and that was where the main fire was.^{xiv}

Few experts have the ability to spontaneously analyze their insights and isolate the rules that guide their tacit knowledge. But if the experts do not recognize the bases upon which they make decisions, attributing them to mysterious forces or, generally, to “experience,” then it will be extremely difficult for them to transfer their knowledge to novices. The novices, in turn, will be left with a piece of advice that they must accept on faith, and which is unlikely to lead to growth in their own expertise.

The Nature of Expertise (3): Efficiency and Abstract Thinking

Expert performance goes beyond the ability to recognize previously encountered patterns. Because their knowledge is more abstract and contextualized, experts do not have to review basic factual information, or struggle with distinctions between relevant and irrelevant information. Their decisions instead tend to be intuitive, rapid, and efficient. Experts are able to access their vast archive of patterns and select a small number of high-quality responses. In the field of medicine, for example, “experts encode information about patients into a higher level representation that allows them to reason about diagnostic alternatives without the need to reinterpret basic facts.”^{xv} Expert physicists organize problems around abstract, general laws, and integrate possible solution plans into their apprehension of the problem, while students invoke formulas that in turn suggest specific calculations.^{xvi} “Experts... are able to evaluate effectively what is relevant in specific contexts and are thereby able to focus primarily, or exclusively, on the information that is of value for the task at hand.”^{xvii} This combination of pattern recognition, abstraction, and focusing on only the relevant dimensions of the problem results in a highly efficient, fluent decision process in complex tasks.

Klein calls this ability “recognition-primed decision making.”^{xviii} He describes the process that firefighter commanders used to evaluate emergency situations:

Even when faced with a complex situation, the commanders could see it as familiar and know how to react.... The commanders’ secret was that their experience let them see a situation, even a nonroutine one, as an example of a prototype, so they knew the typical course of action right away.^{xix}

We will further explore this idea later when we discuss the schemata through which people process information, and the “receptors” that are necessary to assimilate new information.

The Nature of Expertise (4): Extrapolation from the Known to the Unknown

Once they recognize a particular pattern, experts can then extrapolate from that pattern to generate and evaluate hypothetical alternatives. Some of these solutions might have been tried in the past (“The last time I encountered something like this, I tried X and that worked pretty well.”). At other times, the pattern match might be imperfect (“This reminds me a little of a CT scan I saw last year....”) or there might not have been a solution associated with the pattern. But because the understanding is relatively abstract, and not tied to a specific instance of a pattern, the expert can anticipate the consequences of various options arising from the data. For example, a chess player recognizes the significance of a position, even one not previously encountered, realizes there are numerous directions the game could go, anticipates the consequences of each of these different lines, then makes the “best” choice. At the highest levels of mastery, this process is largely unconscious.

Of particular interest to our study, however, are cases *where there are no patterns in the past to which the expert can compare the present situation*. E-commerce was new, and business models based on it untested. Who was to say that “aggregating eyeballs” was or was not a flimsy basis for making money? There are some interesting possibilities for experts to deal with unprecedented situations. First, like the chess masters, the expert may recognize that comparisons with past experience are risky, but because the essential features of the situation have been abstracted—perhaps at a higher level—a solution suggests itself. (“This is a new model for making money. However, it’s still a startup company, and the old rules of entrepreneurship should still apply.”)

Second, when the solution to a problem lies outside the expert’s domain, he or she may attempt to shoehorn the problem into the domain anyway. This is similar to the concepts of “mental set” and “functional fixedness” that psychologists have studied, in which it is difficult to break out of familiar ways of responding. Research by Wiley has demonstrated that baseball experts performed more poorly than non-experts in a task that appeared to relate to baseball, but where the solution lay outside that domain.^{xx} Similarly, when chess experts are briefly presented with random or implausible chess positions and asked to reconstruct them, or when expert accountants are informed of new laws that disallow deductions and asked to complete tax returns, performance may deteriorate below that of non-experts. The suspicion by the technologically savvy young entrepreneurs that the Silicon Valley gurus “just didn’t get it” was fuelled in part by a belief that the old rules no longer applied and that the gurus were slow to realize it.

Therefore, it was difficult for *both* novices and experts in our study to judge the validity of advice. Where the guru’s advice applied to generic human behavior (e.g., handling conflicts among board members), both entrepreneur and coach were reasonably confident that advice based on experience with the “old economy” still applied. Where the issue to be addressed was tied to an understanding of how consumers would use the Internet, *neither* entrepreneur nor coach could be certain that the old rules applied.

Everyone was experimenting simultaneously and the gold rush mentality meant that there was no time to stop and learn.

The Development of Expertise: The Ten Year Rule

The transfer of expertise is made difficult not just by the nature of expertise, but by the way expertise develops.

Most evidence suggests that it takes at least ten years to become an expert.^{xxi} Even Bobby Fisher, a truly gifted chess prodigy, needed nine years of intensive study and competition to become an international grand master. Ericsson and his colleagues^{xxii} describe the process of *deliberate practice* as crucial in the development of expertise. While the sheer amount of experience in a domain is not a powerful predictor of expertise, deliberate practice—the combination of an extended period of concentrated effort, plus feedback from a coach that allows for correction of errors—has been shown to lead to expertise in a wide variety of domains, including competitive sports, music, and chess.^{xxiii} Of course, ten years or more of deliberate practice may be a necessary condition for the attainment of expertise, but it is hardly sufficient. Even with great effort, those with insufficient native talent (including the inherent willingness to engage in long hours of practice from an early age) would require correspondingly more time, and may never become recognized experts.^{xxiv}

The “ten year rule” places inescapable limitations on the development of expertise in entrepreneurship or any other complex knowledge domain. Attempts to accelerate the process of moving along the continuum of expertise through wise coaching can certainly facilitate, but cannot substitute for years of deliberate practice. In 2000, when there were more ideas for companies than people to develop them, one of our coaches said: “there aren’t enough CEOs in Silicon Valley; we have to *grow* them.” This statement reflects a basic misunderstanding about the nature of expertise. CEOs couldn’t be grown fast enough, even with a lot of coaching, to head up all the companies that needed them.

Transferring Expertise

In the previous sections, we discussed the nature of expertise and how it develops over time. We have identified a number of implications of this literature for how expertise can or cannot be transferred. In the following sections, we consider how the experts in our study attempted to transfer their expertise to the entrepreneurs they were coaching.

The Importance of Receptors

Cognitive psychologists have developed the concept of *schema* (also called a *mental model*) to understand how people understand, process, and learn new information. Schemata represent our understanding of what is normally true in a given situation. For

example, I may have a schema that companies have a CEO, or that a board meeting has an agenda, or that venture capitalists expect to earn returns on their portfolios. With those schemata, I would be surprised to encounter a leaderless company, an unstructured board meeting, or an altruistic venture firm. If I have a particular representation of reality, however, and someone attempts to teach me facts that are inconsistent with that schema, I may have difficulty learning those facts. An experienced coach views companies as profit-generating operations; a young Internet entrepreneur, circa 1999, sees companies (or at least her kind of company) as generators of traffic to the web. These two people will have difficulty communicating with one another.

Related to the concept of schema is the idea that in order to assimilate new information, one must be cognitively prepared—one must have the facts and structures into which the information can fit. John Bransford, et al. apply this reasoning to school settings: “To develop competence in an area of inquiry, students must...have a deep foundation of factual knowledge [and] understand facts and ideas in the context of a conceptual framework.”^{xxv} More generally, cognitive scientists have concluded, “We remember well when we can make ‘connections’ between incoming material and what we already know.”^{xxvi}

The anthropologist Colin Turnbull tells a poignant story that illustrates this point. In his book, *The Forest People*, he chronicles his life among the BaMbuti, a pygmy tribe in present-day Zaire who lived out their entire lives in dense forest. One day, Turnbull invited a curious BaMbuti man, Kenge, on an excursion onto the savannah, a treeless plain where Kenge had never before ventured. Grazing several miles away was a large herd of buffalo.

He turned to me and said, “What insects are those?” At first I hardly understood; then I realized that in the forest the range of vision is so limited that there is no great need to make an automatic allowance for distance when judging size. Out here in the plains, however, Kenge was looking for the first time over apparently unending miles of unfamiliar grasslands, with not a tree worth the name to give him any basis for comparison....When I told Kenge that the insects were buffalo, he roared with laughter and told me not to tell such stupid lies....[A]s we got closer, the “insects” must have seemed to get bigger and bigger. I was never able to discover...whether he thought the insects were changing into buffalo, or that they were miniature buffalo growing rapidly as we approached. His only comment was that they were not real buffalo, and he was not going to get out of the car again until we left the park.^{xxvii}

Although such stories tend to be told about pre-industrial cultures’ first encounters with novel experiences, such as airplanes or Polaroid camera shots, the phenomenon characterizes us all when we are asked to react to an event or activity with which we have no prior experience. To someone who is not a “gamer,” i.e., who plays a lot of electronic games, the following question is almost unintelligible: What three-dimensional avatar would you like in the next MUD you enter? Gamers have had the

experience of representing themselves in cyberspace as some three-dimensional object (an avatar) while they played in a Multi-user Domain (MUD). Even when the *terms* are explained, however, a non-gamer will not know what criteria to use in selecting an avatar, or what it is like to enter an environment shaped by other users. Someone who has not played such games lacks the receptors to process the query intelligently.

Most of the founders of startup companies we studied lacked even the most rudimentary knowledge of building a company—they were true novices, which is why they sought the advice of experts. But what was the responsibility of the coach: To teach “Advanced Management 301” to those without any education or experience in business? Given that the novices lacked the necessary receptors, plus the limitations imposed by the 10-year rule, such a strategy would be doomed. Instead, the coaches had to start with “Management 101.” It was the responsibility of the coach to transfer enough knowledge to keep the company—and the entrepreneur—moving forward. What they *couldn't* do was to take the novice all the way to master within a year or so.

Stan Meresman, a coach with many years experience working with startup teams, expresses the contrast between working with experienced and inexperienced entrepreneurs following the bursting of the bubble:

I can't tell you how many companies in the last 18 months I've sat at board meetings where we say [to the entrepreneur]: “Assume that you can never raise any more money. Ever. Therefore, we need to take the cash we have and have it last until we're cash flow positive. Which means we need to reduce the burn rate.” It stops the meeting cold. Then the entrepreneur blurts out something like: “Well, we wouldn't be able to do that unless we take out 25% of our people and not do this new project. And [I say]: “Thank you for listening.” It takes a while to do it; the experienced entrepreneurs get it, do it, run with it. You come to the next board meeting and it is already implemented and done. With the inexperienced entrepreneurs, you have to go through it again, to explain again why the plan they've now presented, which had like a five percent cutback, still doesn't get us to cash flow positive. [You tell them]: “So you want to push out another quarter or two before we go off the cliff, but it just doesn't get us where we need to go.”^{xxviii}

Most of the coaches we studied spent considerable time with their charges, providing them with experiences and factual knowledge and modeling appropriate behavior, in the process building up the novices' receptors. However, in most cases there was a clear expectation that the startup team could take the company only so far, that they would not be able to reach the requisite level of entrepreneurial expertise fast enough to take the company to the next level. Beyond that point, more seasoned management—those with more receptors—would have to be brought in.

Motivation and Ability to Teach and Learn

In our study, motivation was almost never an issue with either coaches or entrepreneurs; they selected each other. In only one instance did a coach describe his charge as “uncoachable.” During the time of our study, coaches who were willing to take on green entrepreneurs and help them reach the point where their company had a reasonable chance of success were scarce commodities, and the startup entrepreneurs knew it. Similarly, the experts did not want to waste their time on entrepreneurs who were unwilling to learn. The mutual due diligence resulted in expert-novice pairs that were genuinely interested in advancing the latter’s knowledge, and in the process enhancing the value of the company. And, of course, if the company succeeded, the coach—who typically owned part of the company—succeeded as well. The result, at least in our study, was a relationship in which the coach provided a great deal of “mind-share”—extensive periods of time working closely with the novice.

Motivation, of course, is no guarantee that lessons will be effectively taught and learned. There are at least two basic reasons why coaches vary in their effectiveness as teachers: First, because there is almost always a large gap between the level of expertise of the two, it is difficult to gear the teaching to the level of sophistication of the novice’s receptors. “There is a good deal of evidence that learning is enhanced when teachers pay attention to the knowledge and beliefs that learners bring to a learning task, use this knowledge as a starting point for new instruction, and monitor students’ changing conceptions as instruction proceeds.”^{xxix} In other words, the coach must be cognizant of the novice’s receptors, and build on prior knowledge. When this advice is not followed and the coach presents information at his or her level rather than that of the novice, the novice will either not receive the information at all, or may categorize it in a way not intended by the coach.

Second, as will be discussed shortly, the most powerful ways of teaching require that the learner be actively involved in his or her own learning, e.g. through experimentation and joint problem-solving. Coaches clearly vary in terms of how deliberately and frequently they utilize such strategies.

Implications for the Effective Transfer of Expertise

The foregoing suggests a number of conclusions regarding the transfer of expertise in entrepreneurial settings:

- The essence of expertise is the ability to recognize patterns the expert has witnessed over a great many years. The use of rules of thumb may summarize a number of these patterns, but may be taken out of context by the novice.
- Much of expert performance is tacit in nature, and the expert may not be able to explicate the rules that guide their decision making.
- Expertise in entrepreneurship involves a great many components, all of which are important to a new company’s leadership. No one coach is likely to possess expertise in all of these components.

- When the expert is not able to draw on past experiences—that is, if there is no meaningful context, or the present situation is highly unusual—then his or her advice may be no better than a novice’s.
- When the gap in knowledge between expert and novice is large, the novices will lack the receptors necessary to receive or properly categorize the information.
- Not all coaches are good teachers, sensitive to the level of the novice’s knowledge and what techniques will be most effective.

The conclusion to each of these bullets is the same: “Therefore, it is difficult to efficiently, effectively, rapidly transfer expertise.” Does this conclusion impose insuperable limits on the extent to which novices can learn, or on the speed at which the transfer of expertise can take place? It is certainly not impossible for a coach to work effectively with a novice to help him or her progress along the novice-apprentice-journeyman-master continuum. In fact, data from our study suggest that the entrepreneurs learned a great deal. During our second round of interviews, each entrepreneur was asked to respond to several items related to expertise, including the following:

- The 4-point expertise continuum, anchored by “Novice (Beginner),” “Apprentice (Intermediate),” “Journeyman (Advanced),” and “Master (Virtuoso),” was presented and the entrepreneur was asked to indicate where he or she would place himself or herself at the present and a year ago. (See Figure 1.)
- Two items designed to assess the sources of knowledge used by the entrepreneur, at the present and a year ago: “What percent of the entrepreneuring knowledge to lead and run the company (not industry or technical knowledge) that you as CEO are [were] relying upon is [was] coming from each of the following sources: (a) my own knowledge, experience and education; (b) the contributions of the coach; (c) the contributions of other coaches; (d) the contributions of others in the company, including co-workers and board members; (e) the contributions of people outside the company; and (f) other.

On the first item, there was a change from 2.07 (slightly to the right of “Apprentice”) to 2.94 (slightly to the left of “Journeyman”), indicating that the entrepreneurs at least *perceived* that they had increased their expertise over the past year. On the other two items, on average the entrepreneurs saw themselves as more self-sufficient today than they had a year earlier: Their ratings of “my own knowledge, experience and education” increased from 42.5% to 52.9%. Of course, these are self-ratings and retrospective ones at that; but they do suggest that some transfer of expertise had occurred, at least in the mind of the entrepreneur.^{xxx} Most were more confident of their own abilities—even after a particularly difficult year of economic turbulence—than they had been when they started the companies.

In a number of cases, the coaches were spending *more* time with the entrepreneurs during the second year than in the first. Whereas in the first heady months of starting up, the entrepreneurs were preoccupied with growth, in the second year of operation, many

were learning how to cut back and do more with less. For most of the coaches, this was a return to business as they knew it; the patterns were familiar and they had, if anything, even more to offer in the way of guidance than they had the first year.

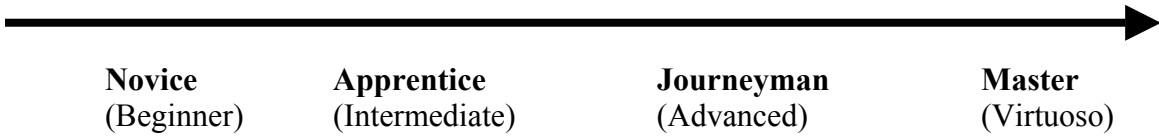


Figure 1: Stages of Knowledge and Expertise

Modes of Transfer

Clearly, the entrepreneurs believed that their expertise had grown in a short period of time. What can account for this growth? The expert-novice pairs had a lot going for them. The coaches were mostly experienced, the entrepreneurs were bright and brought domain knowledge to the partnership. Both were highly motivated to make the startup successful. In almost every case the novice was “teachable,” realizing he or she had much to learn from the coach. What varied considerably from coach to coach were the methods employed for transferring expertise. These methods varied along a continuum of increasing self-directedness on the part of the novice. (See Figure 2.) Some coaches viewed themselves as dispensing knowledge directly, in neatly structured packets of advice. Others tried to actively involve the novice in the learning process. The more opportunities the novices had for active entrepreneurial experiences, for monitoring and reflecting on their behavior, and taking responsibility for their own learning—that is, the more opportunity there was for “deliberate practice”—the greater the likelihood of successful transfer of expertise.^{xxxii}

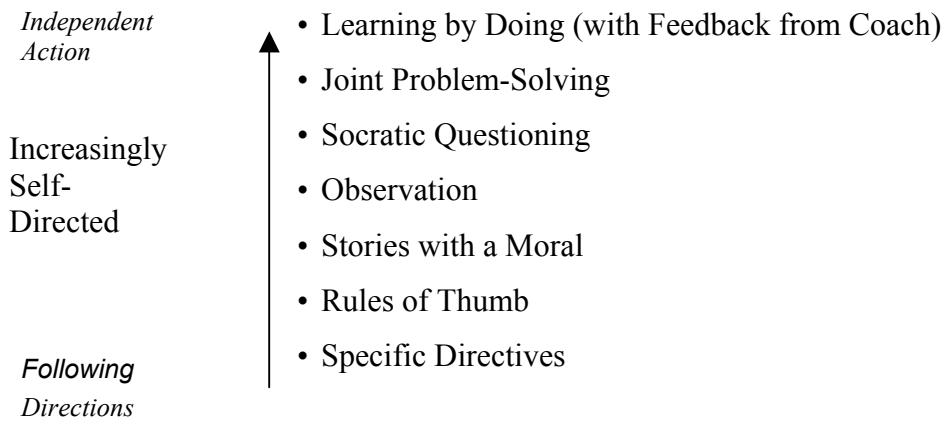


Figure 2: Ways Of Learning

1. Specific Directives

At the lowest level of self-directedness, the coach simply tells the entrepreneur what to do, and little is required of the entrepreneur except to pay attention. Such directives can be very helpful and efficient when the founders are experienced and have the necessary receptors, as was the case in a board meeting that we observed, in which the mentor lectured the founders on setting sales targets:

You need to build the sales funnel. If the target is \$500,000 this year, and you already have \$200,000, you need \$1 million in opportunity in the pipeline. When you reach 90% of that, go to a new projection of \$1-3 million. You need 3-6 times the deals in the funnel. If next year you have \$1 million in revenues for products and \$4 million in services, how is

it split each quarter? How are you going to achieve it? This is what the strategy is. It's easier for the board and future investors if you can show what was promised, what is delivered, what is in the funnel, what is committed for a particular date. . . . You want to be sure that the process is very clear, that everyone gives the same message to the outside world. Things should not be done on an ad hoc basis.^{xxxii}

2. Rules of Thumb

Novices frequently find rules of thumb useful shortcuts to more contextualized knowledge, and coaches rely on them to transfer knowledge quickly and efficiently. “Don’t lead away from kings” in bridge, “control the center of the board” in chess, or “It’s the economy, stupid!” in politics, are easy to remember and execute and, like most generalized rules, are frequently effective, at least in “typical” situations. One experienced coach, Craig Johnson, believes that many problems encountered by startup entrepreneurs are due to failures to do things in the proper sequence, and this rule is illustrated in the following example:

A classic example of being out of sequence is a company that is so worried about competition that it raises a lot of money and starts building a sales force before it's finished developing its product. And what often happens is you incur the cost of building a complete sales force and offices and salespeople and everything assuming the product will be ready to ship on March 2 and it turns out that the product isn't ready until September 30 and then even then it's not really ready. I have a client that got exactly into this mode where the founders had raised \$100 million but thought that was plenty of money to get the job done. They built a very expensive sales force and then discovered some very fundamental technical problems to the product that required them to go back to the lab and review. In the meantime this sales force was in idle, with nothing to sell and burning millions of dollars per month. Ultimately the company had to lay off the same people they had just hired and it was very disruptive. That's basically getting things out of sequence.^{xxxiii}

The most common rule of thumb our expert entrepreneurs imparted to their novices was “focus, focus, focus.” In some cases, this translated as “focus on software, not hardware,” or “focus on market A, not market B.” B.V. Jagadeesh used a metaphor in urging the Edurite team in Bangalore, India to focus: “You’re throwing darts in many places, going after too many opportunities, rather than finding the key markets.”^{xxxiv} However, the rule of thumb to focus can also conflict with other rules of thumb, such as “think big.” And novice entrepreneurs are not usually able to make concrete decisions—or at least good ones—on the basis of such abstract concepts.

3. Stories with a Moral

Relating stories based on past experience can be a memorable way of transferring lessons learned from that experience.^{xxxv} This is particularly true when the recipient of the story is led to apply the moral of the story to his or her own company, as illustrated in the following example. During an ActivePhoto board meeting, one of the young founders was reporting on the company's free cash and how to invest it. Board member and experienced coach, Bill Krause, responded with a cautionary tale: Many years before, a CFO of his acquaintance wanted to invest his company's cash in a high-yield, high-risk instrument. A senior board member told him, "No one will remember the extra 1-1/2% you made. But they will remember your losing \$10 million."^{xxxvi} The moral of this story was not lost on the ActivePhoto entrepreneur; the cash was invested conservatively.

4. *Observation and Modeling*

If coaches spend significant time with their novice entrepreneurs, there are ample opportunities to observe expertise in practice. Sanjeev Malaney, founder of MediaTel, brought in experienced coach, Rich Zalisk, to assume the temporary position of President. Reflecting on his own development as a CEO, Malaney commented, "A lot of my education came from observation. We had an issue here, how did Rich solve it? How did Rich do this? How did Rich do that? How did changes occur? Whether it be something as simple as how do you go about doing effective business planning, how do you facilitate bringing your VPs together and getting them to agree as to what you are going to do next....I learned mostly by osmosis."^{xxxvii}

5. *Socratic Questioning*

One of our experienced coaches, venture capitalist K. O. Chia, describes how he uses the "focus" rule of thumb, but provides a context to make it operational:

I frequently use that word, focus, but focus is very abstract, and not very many people understand what that means. It's [more useful to provide] a particular direction that inherently is making [the entrepreneur] focus. Things like, "What are your top three priorities today?" I often say that. Or if I'm in a board meeting, I say, "What are your top three accounts that are going to bring you your revenue in the next quarter?" And it puts meaning into the word focus. Because if you just tell him "Focus," in his mind focus means run faster. And that is not what you want.

K. O. Chia's way of demonstrating the meaning of "focus" illustrates a give-and-take, Socratic method of teaching and learning. One of the entrepreneurs working with Chia, Alex Chan, gave a concrete example of this process as he was trying to understand Chia's point that the business was not going to be easy to scale up:

[Q: Did you understand that before you talked to him, that this was not going to be easy to scale?]

Not exactly.

[Q: So he clarified that for you?]

Yes. Because he keeps on asking us questions, and lets us answer, or give him the answer. And because we also have to think about the questions, we started to understand, yes, this is not an easy business, not easy to scale. He also asks us, “Hey, today you are doing \$10 million. How are you going to scale to 50, 60 million? How much time do you need to grow the business to that level?” So we started to see this gentleman... is really someone who can help us to grow to the next level....

6. *Joint Problem Solving*

Experts have one great advantage over novices when evaluating something truly new: They are more likely to reflect on their current state of knowledge and identify gaps and shortcomings, then move to fill those gaps. That is, they are more likely to know what they don’t know in a given knowledge domain.^{xxxviii} For example, one of our senior respondents, asked to help coach an Internet startup, at first tried to decline, saying, “I don’t understand this. I can’t help you. I don’t understand this model, I don’t know how to play this game, there is nothing I can do to help. Go find somebody else.”^{xxxix}

This heightened awareness of the limits of one’s own expertise has an important consequence. Experts are more likely to seek to arrive at solutions through joint problem-solving, as evidenced in the following admission by the same expert just quoted:

“OK, I’m in it. And now we’ve got this problem and it looks like the new model is the way to go, so I’ll do my best to help get through this, but I don’t know what I’m doing, and you guys need to understand that I don’t know what I’m doing, but I’ll try to help.” So you get into a mode where you don’t trust all of your previous expertise. You know that a lot of it will be helpful, but some may be harmful, and you don’t know which is which. The key to being successful... is to realize that and don’t just quit using your past experience. Just look at it as: I don’t know anything for sure, we’re all experimenting in this together, let’s just go and do what seems right.^{xl}

Short of actually going into the field to conduct experiments, an exchange of views between coach and entrepreneur, in which disagreements are discussed and argued, is the most active form of engagement. In the following excerpt, entrepreneur Tom Moore reflects on his interactions with venture capitalist, Russ Siegelman.

We disagree on certain things, but we work real well together. I wouldn’t say that we come to the table with exactly the same ideas, but in a very short order, Russ and I know we’re in the lifeboat together, and in pretty rough seas, with very big players. We know we need to make quick

decisions, get aligned, and keep going, and sometimes I buy into what he's thinking, and sometimes he buys into what I'm thinking.

7. *Directed Action and Experimentation*

At the far extreme of self-directedness, the coach would instruct the entrepreneur to perform some experiment, reflect on the results, then discuss them with the coach. For example, Michael Chiarello, founder of Napa Style, reports on how his coach, Fern Mandelbaum, directed him to find out what "Napa" meant to ordinary people.

[She asked me] what does Napa really mean to America, does it just mean something to you and me, because we live in northern California? Or does it mean auto parts? Boom we would go off and answer that question. Five of us sent [an email questionnaire] to ten of our friends and asked them to send it to ten of their friends, with their response. So we went out ...to a good section of America for sort of a grass roots reach for what does Napa mean, close your eyes and tell me what Napa means to you. You found a few who said auto parts, but the majority came back saying it means quality, premium, approachable, country and a lifestyle....

Consider how much less Chiarello would have learned had Mandelbaum simply *told* him that "Napa" might mean different things to different people.

Active Learning

The review of some of the cognitive psychology literature on expertise summarized at the front of this paper suggests a number of reasons why this last mode of transfer is likely to be much more powerful than the others. First, directed action, combined with feedback from the coach, captures the essence of what the cognitive scientists mean by "deliberate practice": The novice monitors and reflects on his or her experiences, and this has been shown to be crucial in facilitating the transfer of expertise. Researchers in cognitive psychology have also demonstrated that the more an individual is pushed to discover and to generate potential answers for himself/herself, the longer the generated material remains in memory. That is, if people go through the mental exercise of constructing hypotheses and are provided with an answer only after doing so, they will remember the solution longer.^{xlii} Second, in this kind of directed experimentation, not only are the protégés absorbing the information gained in the experiment, but they are also developing an enhanced capacity to think in terms of hypotheses and tests, i.e. a way of learning. In his ethnographic work on the Toyota production system, justly famed for its high quality and unusual learning environment, Spear (2002) found that an essential element underlying the outward trappings of the system was a mindset engendered throughout the organization. From operators on the line to team leaders to managers, employees were trained to pose improvements as hypotheses—and test them through quick prototyping. Furthermore, once individuals grasped the power of self-motivated experimentation, they were expected to expand their grasp in two ways: enlarge the scope

of the experiments to encompass a larger segment of the overall system, and coach others in the methodology.^{xliii}

The evidence from both laboratory and other intensive field research thus clearly indicates that novices are more likely to move up the ladder of expertise if the coaches employ active learning techniques. It is not possible for us to extrapolate from this implication to prove that using active learning techniques fostered greater knowledge transfer in the companies studied; not being present at every interaction of the pair, we have only the protégé's characterization of the coaching techniques.

So, what have we learned from studying these attempts to transfer knowledge and grow expertise? We know that there are inherent limits to the rapid transfer of expertise to a novice. We have learned that the nature of human information processing, the very nature of expertise as well as how it is achieved, set those limits. We have also learned that there are effective ways to mentor as well as less effective ways. Unless the coach is truly devoid of expertise (and we did see a few of these), coaching helps in complex knowledge-based learning, just as it does in athletics. Even star athletes retain coaches, knowing that a set of experienced eyes can spot lapses in performance that the athletes themselves will not identify and can suggest possible solutions to problems—*in context, as they arise*. The entrepreneurs whom we studied clearly learned a lot from their coaches, in all sorts of domains, from strategy to negotiations to interpersonal relations.

Knowledge varies in terms of its “stickiness,” that is, how difficult it is to transfer from one situation to another.^{xliii} It is not easy to transfer content knowledge, or “know-what,” but process knowledge (“know-how”) is particularly difficult to transfer because it relies even more upon pattern recognition, which in turn depends upon experience and deliberate practice. Anyone interested in transferring knowledge is tempted to search for the magic mind meld that will create instant experts, but as this study demonstrates, that search is futile. Coaches and entrepreneurs must realize that the transfer process has to proceed at a reasonable pace and cannot be significantly compressed. Trying to proceed at Internet speed may cause an Internet-speed flameout.^{xliv} Knowledge-based reaction to complex events requires an accumulation of first-hand experiences. Coaches can jump-start an entrepreneurial venture and help to guide the entrepreneur through the shoals of innovation. However, if coaches want to increase the learning of their protégés, they will concentrate less on the *transfer* of knowledge and more on helping the novices *create* their own knowledge, through guided experience and joint problem solving.^{xlv} The greater the uncertainty surrounding the knowledge base—and the entrepreneurial climate in which our study was conducted was fraught with uncertainty—the more critical becomes the capacity to experiment and learn, to formulate and test hypotheses. One of the greatest services provided by coaches in our study was the stimulus—and often the venue—for entrepreneurs to test directly their evolving business ideas with other companies, prospective clients and real customers.

Experienced coaches realize the limits of their expertise, and will bring in additional coaches to fill the gaps. For example, when asked by startup ActivePhoto's founders for assistance in getting their company off the ground, Fred Gibbons knew that

his strengths as a coach lay in shaping the business proposition, finding the “sweet spot.” However, he realized that new companies, particularly those headed by entrepreneurs in their early twenties, needed a lot of help with implementing processes—and process was not Gibbons’ strength. For that assistance, he brought in Bill Krause, former CEO of 3Com and now a startup coach, who immediately began instructing the founders in such basics as how to set an agenda for a board meeting. Another entrepreneur characterized two coaches who were helping the company: “They couldn’t be more different. [One] is much more oriented towards the capitalization of the company, where we’re going, building shareholder value and managing the board, you know the front end business issues...and [the other] is much more oriented to the back of the value chain--operations. So that’s why it works so well for us. So we don’t have two people both trying to give us advice on inventory optimization and that kind of stuff.”

Finally, entrepreneurship is rarely a one-shot affair. Novices should not expect to move to the status of master within one company experience, despite some highly visible examples to the contrary, such as Bill Gates of Microsoft or Bill Hewlett and David Packard of HP fame. Such people are atypical in startup experience. Most of the entrepreneurs we interviewed were either already serial entrepreneurs or were planning to be. Maybe the first startup will fail; or it will succeed without the original founders. But being actively engaged in that first company will move the founders along the continuum, perhaps from novice to apprentice, where they will have developed enough new receptors to assume a more lengthy tenure with the next company. And, perhaps in ten years, or— if the coaching has been especially strong—nine years, today’s novice will be one of the experts being called upon to lead a startup to the promised land.

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Endnotes

ⁱ Bronson (1999)

ⁱⁱ Interview with Robert Maxfield, May 27, 2000.

ⁱⁱⁱ Interview with Robert Maxfield, May 27, 2000.

^{iv} This attention to personal development is generally emphasized in the research literature on mentoring, whereas the role of an experienced person in transferring technical or domain knowledge is usually found in research on apprenticeships. See Higgins and Kram (2001)

^v e.g., Bloom (1985) Dreyfus and Dreyfus (1986)

^{vi} Dreyfus and Dreyfus (1986)

^{vii} Simon & Chase (1973)

^{viii} Richman, et al. (1996).

^{ix} Interview with Fred Luconi, August 22, 2000

^x Interview with Robert Maxfield, May 27, 2000

^{xi} The patterns are often heavily contextualized, i.e., represent what some have called “situated” knowledge that draws upon local cues for meaning. See Brown and Duguid (2000)

^{xii} Dreyfus and Dreyfus (1986), pp. 35-36

^{xiii} Klein (1998), p 32

^{xiv} Klein (1998), pp. 32-33

^{xv} Ericsson, in Ericsson (1996), p. 17

^{xvi} Ericsson, in Ericsson (1996), p. 14

^{xvii} Vicente and Want (1998), p. 48

^{xviii} Klein (1998), p. 17

^{xix} Klein (1998), p. 17

^{xx} Wiley, (1998)

^{xxi} Simon and Chase (1973)

^{xxii} Ericsson, in Ericsson (1996)

^{xxiii} Ericsson, in Ericsson (1996)

^{xxiv} Ericsson, Krampe and Heizmann (1993). Cited in Ericsson, 1996

^{xxv} Bransford, Brown, and Cocking (2000), p. 16

^{xxvi} Schwartz and Reisberg (1991), p. 356

^{xxvii} Turnbull (1961), pp. 252-253

^{xxviii} Interview with Stan Meresman, June 19, 2001

^{xxix} Bransford, Brown, and Cocking (2000), p. 11

^{xxx} While this average figure reflects the general trend, there were a couple of instances in which the entrepreneurs reported relying *less* on their own experience in the second year—notably because they had learned that their own experience was a poor guide in this particular business.

^{xxxi} The primary goal of startup coaches is, of course, not always to transfer their expertise to the *founders* of those companies. While some of the coaches we interviewed were clearly working for the founder, and did what they could to promote his or her success, others, particularly venture capitalists, saw their investment tied to the success of the *company*, and the growth in expertise of the entrepreneur was

secondary. While they still saw their job as at least partially one of coaching, the VCs expected to gradually disengage themselves from frequent knowledge-transfer efforts. When the coach's primary goal is the growth and success of the company, then there are widely used practices to *import* expertise, rather than home-grow it. First, it sometimes happens that a founder (or the company's directors) will bring in *temporary* senior management to help run the company. This model has the virtue of putting the company in the hands of an experienced manager, as well as creating an intense relationship between founder and temporary or "virtual" CEO, which can facilitate the transfer of expertise. Second, and far more common, is the practice of making clear to the founders at the outset that they will be able to take the company only to a certain point, after which, if the company still shows promise, a team of more experienced senior managers will be brought in. In fact, a recent study found that 35 percent of the founders of *successful* startups were replaced within five years, as investors thought a more experienced management team could take the company further. Typically, at that point the founders will either leave the company or will assume a more symbolic role, such as "Chief Strategist."

^{xxxii} Notes from board meeting of Edurite, December 16, 2001

^{xxxiii} Interview with Craig Johnson, January 25, 2000

^{xxxiv} Board meeting of Edurite, December 16, 2001

^{xxxv} Swap, Leonard, Shields and Abrams, 2001

^{xxxvi} Leonard and Swap, 2000

^{xxxvii} Interview with Sanjeev Malaney, March 8, 2000

^{xxxviii} Bransford, Brown, and Cocking (2000), p. 47

^{xxxix} Interview with Robert Maxfield, May 27, 2000

^{xl} Interview with Robert Maxfield, May 27, 2000

^{xli} See, for example, Soraci, et al., 1994

^{xlii} See Spear, 2002. In this paper, Spear demonstrates with paired case studies, the superior performance that results from the application of the active learning techniques.

^{xliii} See von Hippel (1994), p. 429 and von Hippel and Tyre (1995), pp. 1-12

^{xliv} We observed this particularly in those companies hatched in incubators.

^{xlv} One technique not used by any of the coaches studied was the use of instructional case studies, business "experiences" to be analyzed and discussed in groups.

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