Course Research: Using the Case Method

To Build and Teach Management Theory

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Some in the Academy have questioned the usefulness of case studies in teaching sound management theory (Shugan 2006). Our research and experience suggests exactly the opposite – that case studies can unite the development of theory with the teaching of it in a single enterprise we'll call *course research*. Conclusions such as those that Shugan and others have reached stem from misconceptions about the relationship of research, theory, case studies, and teaching. In fact, the proper use of case studies in teaching can help faculty resolve a basic dilemma of academia: Promotion is often based upon our published research, and we find that responsibilities to teach detract from the mandate to publish. When approached properly, case studies can transform teaching into research, and enroll students as "course researchers," whose class participation can be exceptionally valuable in the theory-building process.

Compartmentalizing our world into mutually exclusive realms of research and teaching wastes substantial intellectual energy and insight – our own, and that of our students. In the research side of our lives many of us have learned to train and trust students as junior partners in our theory-building efforts. We readily engage doctoral, MBA, and even undergraduate students as research assistants to collect and examine data. We discuss with these students the hypotheses that emerge from their analyses, and ask them to plunge back into the data to refine these hypotheses. When we walk into the classroom with those same students, however, many of us mentally shift gears into a mode of conveying theory, not developing it. While we work together as trusted research partners outside the classroom, we bifurcate as instruct*ors* and instruct*ees* inside the classroom. We rarely frame classroom activities as opportunities for theory-building – for examining the phenomena, categorizing it, synthesizing hypotheses, and testing them to find anomalies that will yield improved theory. Yet classroom work *can* be structured as theory-building activity, just as out-of-classroom work can be, if case studies are used properly.

To show how research, course development and teaching can be knit together in this way, in this essay we will first present a model of how theory can be built. Though there are other useful models of theory building, the simple one we employ here has proven to be helpful to us and many students and colleagues as we have sought to build, teach and publish better theory for management.[1]

A Theory Building Process

We define "theory" very simply – as a body of understanding. The building of theory occurs in two major stages – a descriptive stage and a prescriptive stage. Within each of these stages, theory builders proceed through three steps. As we'll describe below, case-centered teaching can help students and faculty iterate through these three steps again and again, and

[1] This model was developed first by synthesizing models of theory building that have been developed by scholars of this process in a range of fields. These include Kuhn (1962) and Popper (1959) in the natural sciences; and Campbell & Stanley (1963), Glaser & Strauss (1967) Stinchcombe (1968), Roethlisberger (1977), Yin (1984), R. Kaplan (1986), Weick (1989),Eisenhardt (1989) and Van de Ven (2000) in the study of management and social science. To this synthesis we have added our own observations, derived from studying the research efforts of various faculty members and doctoral students at Harvard, MIT, Stanford and the University of Michigan.

collaboratively build better theory. In other words, theory building, teaching and learning converge to comprise the same process. We'll first explain how these steps are used to build descriptive theory.

The Descriptive Stage of Theory Building

The descriptive stage of theory building is a *preliminary* stage because theory builders must pass through it in order to develop prescriptive theory. The three steps that researchers who are building descriptive theory generally pass through are observation, categorization, and association.

Step 1: Observation

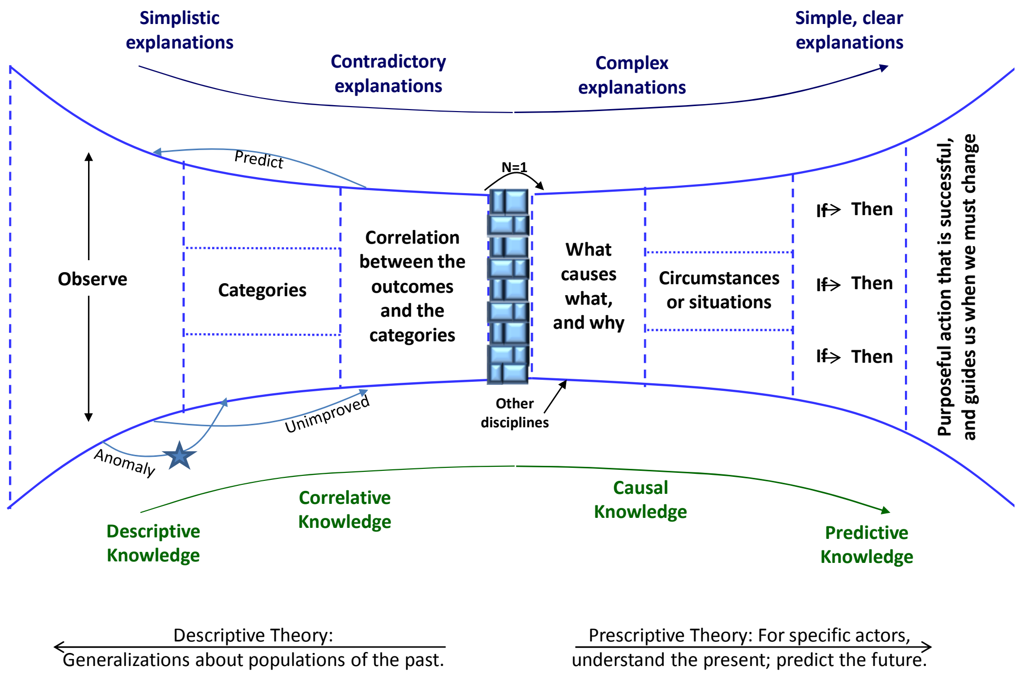
In the first step of theory building researchers carefully observe phenomena and describe and measure what they see. This is important because if subsequent researchers cannot agree upon the descriptions of phenomena, then improving theory will prove difficult. Early management studies such as *The Functions of the Executive* (Barnard, 1939) and Harvard Business School cases written in the 1940s and 50s were primarily descriptive work of this genre. Observation of phenomena can occur anywhere along the continuum from analysis of huge databases on the one end, to field-based, ethnographic observation on the other. This stage of research is depicted in Figure 1 as the broad end of a funnel to suggest the importance of broad and thorough observation.

Researchers in this step often develop what we term *constructs.* Constructs are abstractions that help us rise above the messy detail to understand the essence of what the phenomena are and how they operate. Some examples: Bower's (1970) constructs of *impetus* and *context* describe how momentum builds behind certain investment proposals and fails to coalesce behind others in the resource allocation process. This has helped a generation of strategy researchers understand how investment decisions get made. The path breaking work of Spear (2005) and Spear & Bowen (1999) on the Toyota Production System is built upon their constructs of *activities*, *connections* and *pathways*. Economists' concepts of "utility" and "transactions costs" are likewise constructs – abstractions developed to help us understand a class of phenomena they have observed. We would not label the constructs of utility and transactions cost as theories, however. They are *part* of theories – foundations upon which bodies of understanding about consumer behavior and organizational structure have been built.

Step 2: Classification

With the phenomena observed and described researchers in the second stage typically classify the phenomena into categories. In the descriptive stage of theory building, the classification schemes that scholars propose generally are defined by the attributes of the phenomena. Diversified vs. focused firms is a categorization example from the study of strategy. Lean and inventory-carrying manufacturing systems are categories that have emerged from research in operations. Burgelman & Sayles (1986) built upon Bower's (1970) construct of context by categorizing two different types of context – organizational and strategic. Categorization helps researchers simplify the world in ways that highlight possibly consequential relationships between the phenomena and the outcomes of interest. Management researchers often refer to these descriptive categorization schemes as *frameworks* or *typologies*.

Figure 1: The Process of Building Theory



Step 3: Defining Relationships

In the third step, researchers explore the association between the category-defining attributes and the outcomes observed. Researchers recognize and make explicit what differences in attributes and the magnitude of those attributes, correlate most strongly with the the outcomes of interest. Techniques such as regression analysis can be useful in defining these correlations. Often we refer to the output of studies at this step as *models*.

Descriptive theory that quantifies the degree of correlation between the category-defining attributes of the phenomena and the outcomes of interest is generally able to make probabilistic statements of association representing average tendencies *in a population*. For example, Hutton *et.al.* (2000) examined how stock prices respond to the phrasing in earnings announcements. Their analysis enabled them to assert that, on average across the entire sample of companies and announcements, delivering earnings announcements in a particular way would lead to the most favorable (or least unfavorable) reaction in stock price. But specific managers of specific companies cannot know from descriptive theory whether following that average formula will lead to the hoped-for outcome in their specific situations. This requires the development of prescriptive theory, as we will show below.

How Theory is Improved within the Descriptive Stage

When researchers move through the left-side funnel through observation, categorization and association – and in so doing give us constructs, frameworks and models – they have followed the *inductive* portion of the theory building cycle. Researchers can then improve theory by cycling back to the beginning of the funnel in the *deductive* portion of the cycle – seeking to "test" the hypotheses that had been inductively formulated. This most often is done by exploring whether the same correlations exist between attributes and outcomes in a different set of data than the data from which the hypothesized relationships were induced. When scholars test a theory on a new data set (whether the data are numbers in a computer, or are field observations taken in a new context), they sometimes find that the attributes of the phenomena in the new data correlate with the outcomes as predicted. Such "tests" confirm that the theory is of use under the conditions observed. However, researchers who stop at this point simply return the model to its place in the funnel *tested but unimproved.*

It is only when an anomaly is identified – an outcome for which the theory can't account – that an opportunity to improve theory occurs (Kuhn, 1962). As Figure 1 suggests, discovery of an anomaly gives researchers the opportunity to revisit the early stages in the funnel – to define and measure the phenomena more precisely, or to cut it into alternative categories – so that the anomaly *and* the prior associations of attributes and outcomes can all be explained. Every complete cycle through the theory-building funnel consists of an inductive side and a deductive side.

Kuhn (1962) observed that confusion and contradiction are the norm during descriptive theory-building. It is characterized by a plethora of categorization schemes because the phenomena have many different attributes. In the study of how technological innovation affects the fortunes of firms, for example, an early attribute-based categorization scheme was radical vs. incremental innovation. The correlations that were measured upon it concluded that established firms on average do well when faced with incremental innovation, but stumble in the face of radical change. But there were anomalies to this generalization – established firms that successfully implemented radical technology change. To account for these, Tushman & Anderson (1986) offered a different categorization: competency-enhancing vs. competency-destroying technological changes. This resolved many of the anomalies, but subsequent researchers uncovered new ones for which the Tushman-Anderson scheme could not account. Henderson & Clark's (1990) categories of modular vs. architectural innovations; Christensen's (1997) categories of sustaining vs. disruptive technologies; and Gilbert's (2001) threat-vs.-opportunity framing each uncovered and resolved anomalies for which the work of prior scholars could not account. This body of understanding has improved and become quite useful to practitioners and subsequent researchers (Adner & Zemsky, 2005; Daneels, 2005) *because* these scholars articulated theories that could yield anomalies.

Anomalies are valuable in theory building because *the discovery of an anomaly is the enabling step to less ambiguous description and measurement, and to identifying and improving the categorization scheme in a body of theory*. Researchers whose goal is to "prove" a theory's validity often view discovery of an anomaly as failure – and therefore search for reasons to exclude outlying data points in order to get more significant measures of statistical fit. There typically is more information in the points of outlying data than in the ones that fit the model well, however, because understanding the outliers or anomalies is generally the key to discovering problems in definition & measurement, and in formulating better categorization schemes. Researchers who seek to surface and resolve anomalies therefore tend to advance their fields more productively than those that seek to avoid them.

What types of data can be trusted to yield reliable theory?

A key measure of a theory's quality is the reliability of the data that characterize the phenomena in the first stage of the funnel. Many view numerical data as more trustworthy than qualitative data. But where does "objective" data come from? The data used in many research projects comes from companies' financial statements, for example. Is this objective? Johnson & Kaplan (1987) showed quite convincingly that the numbers representing revenues, costs and profits in financial statements are the result of processes of estimation, negotiation, debate and politics that can produce grossly inaccurate reflections of true cost and profit. Even the "hardest" of numbers, such as those measuring prices and product performance, really are manifestations of the prioritizations, fudging measurements, exaggerations and negotiations that occurred prior to a number appearing as a proxy for all of those things.

The healthiest mindset for researchers is that nearly *all* data – whether presented in the form of a large quantitative data set on one extreme, or an ethnographic description of behavior on the other – are subjective. Numerical and verbal data alike are abstractions from a much more complex reality, out of which the researcher attempts to pull the most salient variables or patterns for examination. Whereas the subjectivity of data from field-based, ethnographic research is glaringly apparent, the subjective etiologies of numerical data are hidden and cannot be reviewed. There should be no smugness amongst quantitative researchers about the alleged objectivity of their data, and no defensiveness amongst field researchers about the subjectivity of theirs. We are all in the same subjective boat, and are obligated to do our best to be humble and honest with ourselves and our colleagues about where our data comes from as we participate individually within and collectively across the theory building cycle.

More often than most of us realize, data about the phenomena comes packaged in the form of, or is extracted from, case studies. What is a case study? We define it simply as a multifaceted examination of a situation. Christensen's (1992, 1997) work in the disk drive industry, by illustration, began with a complete, numbers-intensive history of the disk drive *industry*, which analyzed the technical specifications and components used in every product ever announced by any company in the world, from 1974 to the present. It examined every company that ever entered the industry, whether it sold any products or not, and evaluated data on sales by product category for all companies that did. That case was a complete census, not a statistical sample. Nested within that case were studies of six individual *companies*. These accounts relied on quantitative information supplemented by some qualitative data extracted from interviews. Within each of those were accounts of individual product development *projects*, built with some quantitative data and lots of qualitative information. These were also cases. And within each of these were case studies of individual *people* – built from qualitative, open-ended interviews.

The unit of analysis of a case may be a national economy, an industry, a period of trading on a stock exchange, a population of patients, single patient, a company, a set of projects, the career experiences of a population of people, or a single experience of an individual. *All are* *cases, and all examine data that are subjective abstractions or manifestations of a much more complex underlying reality.*[2] What is important, for the purpose of building theory, is that "case studies, like experiments, are generalizable to theoretical propositions" (Yin, 1984, p. 21). In the descriptive stage they are not, and need not be, generalizable to the populations or universes in which those situations are nested. Generalizability comes with prescriptive theory.

The Transition from Descriptive to Prescriptive Theory

The confusion that often stems from categorization conflicts in descriptive theory becomes resolved when researchers, often through detailed empirical and ethnographic observation where n=1, make a cognitive leap beyond statements of correlation to define what *causes* the outcome of interest. This is depicted in the reverse funnel at the right of Figure 1 whose entry stage is a statement of what *causes* the outcome of interest, not just what is correlated with it.

The usefulness of a theory is its ability to predict the consequence of an action (van de Ven, 1989). Bazerman (2005) has noted that one reason why research in some fields has had so little influence on management is that many social science researchers choose not to be prescriptive. This is depicted in Figure 1 as a brick wall, which often holds academic researchers on the left side of the funnels, ever correlating, but never coming to deep insight about causality. Bazerman shows that prescriptive theory is not only possible to develop in the social sciences. It is desirable.

Prescriptive theory, like its descriptive predecessor, still needs to be improved. Researchers do this by using the theory in real-time action or in *ex post* analysis. Hypothesizing that their statement of causality is correct, they move ahead to test the causal hypothesis: "If we observe these actions or events occurring, these should be the outcomes that we observe." It is only when they encounter an anomaly that they can move to the categorization stage again. Rather than categorizing by the attributes of the phenomena, however, researchers identify *the different situations or circumstances* in which managers might find themselves. They do this by asking, when they encounter an anomaly, "What was it about the situation in which those managers found themselves, that caused the mechanism to yield a different result? By asking this question as they move through the funnel of prescriptive theory, anomaly-seeking researchers ultimately define a relatively complete set of the circumstances in which managers might find themselves when pursuing the outcomes of interest. This allows researchers to make contingent statements of causality – if-then statements that show how and why the casual mechanism results in a different outcome, in each different situation. A prescriptive theory that is built upon well-researched categories of circumstance can help a manager predict accurately what actions will and will not lead to the desired result, given the circumstance in which she finds herself. The circumstance-contingent predictability of prescriptive theory enables managers to know, in any given situation, what they *ought* to do.

The history of research into manned flight is a good way to visualize how this transition from descriptive to prescriptive theory occurs, and how it is valuable. During the middle ages,

[2] This definition of a case is, we believe, broader than but not inconsistent with Yin's (1984, p. 23) definition that "A case study is an empirical inquiry that: 1) investigates a contemporary phenomenon within its real-life context; when 2) the boundaries between phenomenon and context are not clearly evident; and 3) multiple sources of evidence are used."

would-be aviators did their equivalent of best-practices research. They observed the animals that could fly well, and compared them with animals that could not. The vast majority of the successful fliers had wings with feathers on them; and almost all of those that couldn't fly had neither of these attributes. This was quintessential descriptive theory. Pesky outliers like ostriches had feathered wings but couldn't fly; bats had wings without feathers and were very good at it; and flying squirrels had neither and got by. But the R^2 was so high that aviators of the time believed that if they copied the seemingly salient characteristics of the "best practices' fliers, they could fly, too. So they fabricated wings, glued feathers on them, jumped off cathedral spires, and flapped hard. It never worked. Disagreements emerged about the categorization scheme – debates of which of the birds' attributes truly enabled flight, and which didn't. For example, Roger Bacon wrote an influential paper asserting that the differentiating characteristic was birds' hollow bones (Clegg, 2003). With solid bones, Bacon reasoned, man could never fly. He then proposed designs of machines that could flap their wings with sufficient power to overcome the disadvantage of solid human bones. But it still never worked. Armed only with the correlative statements of descriptive theory, aviators kept killing themselves.

Then Daniel Bernoulli, through his careful study of fluid mechanics, identified a shape that we call an airfoil which, when it cuts through air, creates a mechanism that we call lift. Understanding this causal mechanism made flight possible. But it was not yet predictable. In the language of this paper, the theory predicted that aviators would fly successfully when they built machines with airfoils to harness lift. Crashes were anomalies that Bernoulli's theory could not explain. Crashes, however, allowed researchers to revisit the categorization scheme. But this time, instead of slicing up the world by the attributes of the good and bad fliers, researchers asked, "What was it about the circumstance that the aviator found himself in that caused the crash?" This then enabled them to improve equipment and techniques and articulate circumstance-contingent if-then prescriptions: "This is how you should normally fly the plane. But when you get in this situation, you need to fly it differently in order to get the desired outcome. And when you get in this other situation, don't even try to fly. It is impossible."

Careful studies of anomalies allowed researchers to identify the set of circumstances in which aviators might find themselves. Discovery of the causal mechanism made flight possible. When they then modified the equipment or developed piloting techniques that were appropriate to each circumstance, manned flight became not only possible, but much more predictable.[3]

As described in Figure 1, bodies of understanding evolve from descriptive knowledge, to correlative, and then causal, and ultimately to predictive knowledge. As the body of understanding progresses through these stages of knowledge, researchers' abilities to explain what they are learning evolves as well. Early explanations are simplistic. Then, because researchers' correlation studies' often contradict other correlations measured from different data, researchers' explanations confuse and contradict each other. As understanding progresses, researchers' attempts to convey causal knowledge typically are complex. Ultimately, simple explanations emerge that helps even the non-experts to understand what researchers have learned.

Establishing the Validity of Theory

[3] We thank Matthew Christensen for teaching us with this example.

Those who use management theory usually want to know whether to trust it, where it applies, and where it does not. To help us gauge whether and when we can trust it, Campbell & Stanley (1963) described two types of validity for a theory – internal and external validity. In this section we'll discuss how these concepts relate to our process model of theory building, and describe how researchers can make their theories more valid on both of these dimensions.

Internal Validity

A theory's *internal* validity is the extent to which: 1) its conclusions are unambiguously drawn from its premises; and 2) the researchers have ruled out plausible alternative linkages of the phenomena with the outcomes of interest. Measures of statistical significance and goodness of fit are common methods of assessing internal validity.

Researchers improve the internal validity of a theory when they examine the phenomena from as many perspectives as possible. As long as there's a possibility that another researcher could say, "There's a different explanation for why this happened," we cannot be assured of a theory's internal validity. Scholars who examine the phenomena and outcomes of interest from the perspectives of other potentially relevant academic disciplines or, take the viewpoints of different functional groups in a company, can either incorporate what they learn into their explanations of causality, or rule out other explanations so that theirs is the only plausible one left standing. Burgelman's (2002) reconstruction of the workings of each functional group within Intel as the company exited the Dynamic Random Access Memories (DRAM) business and threw its resources behind its microprocessor strategy is an outstanding example of such research.

External Validity

The *external* validity of a theory is the extent to which a relationship that was observed between phenomena and outcomes in one context can be trusted to apply in different contexts as well. Measures of statistical significance and goodness of fit are not relevant measures of external validity. To illustrate why, consider Christensen's experience after publishing his prescriptive theory of disruption had been inductively derived through empirical analyses of the history of the disk drive industry. Those who read his early papers instinctively wondered, "Does this theory apply outside the disk drive industry?" To address these concerns when writing *The Innovator's Dilemma*, Christensen (1997) sought to establish the generalizability of the theory by "testing" it on data from as disparate a set of industries as possible – including hydraulic excavators, department stores, steel, computers, motorcycles, diabetes care, accounting software, motor controls and electric vehicles. Despite the variety of industries in which the theory seemed to have explanatory power, executives from industries that weren't specifically studied kept asking, "Does it apply to health care? Education? Financial services?" When Christensen published papers that applied the model to these industries, the response was, "Does it apply to telecommunications? Regulated industries? The German economy?" A disk drive engineer even asked, "It clearly applies to the *history* of the disk drive industry. But does it apply to its *future* as well?" As these illustrate, it is simply impossible to establish a theory's external validity by testing it on data. There will always be another set upon which it hasn't yet been tested, and the future will always lie just beyond the reach of data.

External validity can only be created through categorization, and there is a process by which theory progresses in this direction. When an understanding of causality first emerges and it is used to make *ex post* or *ex ante* predictions, researchers uncover anomalies – instances where the prediction failed. Then by asking, "What was it about the circumstance that caused this unexpected outcome?" researchers come to understand the categories of circumstances. A prescriptive theory that is based upon a robust statement of causality is externally valid when the categories of circumstance are mutually exclusive and collectively exhaustive. Mutually exclusive categorization allows managers to say, "I am in this circumstance and not that one." And collectively exhaustive categorization would assure us that all situations that managers might find themselves in with respect to the phenomena and outcomes of interest, are accounted for in the theory. In concept (though never in practice) as researchers asymptotically approach a complete understanding of causality and circumstance, the theory's predictions would be accurate 100% of the time, because the outcomes that the theory predicts are contingent upon a set of collectively exhaustive, mutually exclusive situations in which managers might find themselves.

Several scholars have examined the improvement in predictability resulting from the transition from the attribute-based categorization of descriptive theory to the circumstance-based categorization of prescriptive theory. Consider, Lawrence & Lorsch's (1967) "Contingency Theory," for example. They showed that the best way to organize a company depended upon the circumstances in which the company was operating. In our model, contingency is not a theory *per se*. Rather, contingency is the categorization scheme, and is a crucial element of *every* prescriptive theory. Glaser and Strauss's (1967) treatise on grounded theory, when viewed through the lens of our process model, actually is a book about categorization – though they use different words. Their term *substantive theory* corresponds to the attribute-bounded categories of descriptive theory. And their concept of *formal* theory corresponds to the categories of circumstance in prescriptive theory.

Efforts to identify "the best practices of successful companies" almost always skip the categorization step in the theory process. Researchers in this mode study a set of successful companies, find that they share certain characteristics, conclude that they have seen enough, and then assert that if all managers would imbue their companies with the characteristics of these successful companies, they would be similarly successful. There is rarely a standard remedy that applies to all companies in all situations. By not taking the care to define the circumstances in which their statement of causality would lead to success and when it would not, such researchers discredit their work.

Towards a Prescriptive, Circumstance-Contingent Theory of Teaching

Few of us who instruct business students have framed what we do as employing a theory of instruction – but we all do, at least unconsciously. The theory that most seem to employ is still in the descriptive stage. Shugan (2006), for example, categorizes by the attributes of the courses: lecture-based vs. case-based. The correlative statement he makes at this stage of the funnel is that the lecture method may be a better way to convey theory, for a host of reasons.

The issues Shugan raises aren't limited to business schools. The debate about problem- or case–based teaching vs. lecture teaching is a hot one in medical schools, for example. As with all theories in the descriptive stage, educators are employing many categorization schemes – not just case vs. lecture – in debates about which methods of instruction are better, because there are many attributes of classes. Controversies center on whether distance learning can be as effective as in-person instruction; whether students in smaller classes learn better than those in larger ones; and whether project-based learning might be superior to subject-focused instruction. Researchers at the third step of the funnel of these descriptive theories do their best to measure, on average, which methods of teaching work better than others. And true to form for bodies of understanding that are still in the descriptive stage, the evidence isn't conclusive. There are pesky anomalies in the form of teachers, courses or schools that seem to beat the odds, producing extraordinary results through methods that, on average, aren't as efficacious.

In a very preliminary way, we hope to offer a prescriptive theory to faculty members who are attracted by the opportunity to engage in course research – to design courses and teach them in ways that feed research rather than detract from it. There are three circumstances – which essentially are positions along a continuum – in which faculty members might find themselves when needing to design and teach a course:

1) When wanting to teach a course on a topic around which a body of theory has not yet coalesced, and the teacher-researcher hopes to play a key role in its development;

2) When a significant body of understanding exists, and the teacher wants to improve the theory – by taking it from the descriptive to the presecriptive stage, or by sharpening the categorization scheme by seeking and then resolving anomalies;

3) When the body of theory to be taught is so well established that the marginal returns on efforts to improve it are minimal.

Course Research that *Inductively Builds* Theory

On occasion faculty find themselves needing to design and teach a course on a subject about which a body of theory has not yet emerged. Many faculty members found themselves in this situation when the Internet was emerging in the late 1990s. Others find themselves in this circumstance today, needing to teach students about the collapse of our financial markets. In such circumstances, designing the course to move *inductively* through the theory funnel can be very productive. For example, in 1998 Harvard Business School professor Kent Bowen observed that nearly 40% of his school's graduates ultimately found themselves owning and running small businesses. These weren't flashy venture capital-backed technology start-ups. Rather, they were printing companies, service bureaus, retail stores, and so on. He decided to create a course, called *Building and Running a Small Business (BRSB)* to better serve students who were headed toward that destination. Then discovering that little had been written about how to run low-tech, slow-growth companies, he tackled the problem with an inductive course design.

Bowen first researched and wrote a series of cases that simply described what managers in these sorts of companies worry about and do. The purpose of each case discussion was to help the professor and students to understand the phenomena thoroughly. After a few classes, Bowen paused, and orchestrated a class discussion to define patterns in the phenomena – to begin categorizing by type of company, type of manager, and type of problem. They next explored the association between these types, and the outcomes of interest. This portion of Bowen's course had an *inductive* architecture that moved up the theory pyramid. In the next portion of his course, armed with their preliminary body of theory, Bowen and his students cycled deductively to the left side of the funnel to examine more companies in a broader range of circumstances. This allowed them to discover things that their initial models could not explain. This helped them to improve their constructs, refine their classification schemes, and improve their understanding of what what actions tended to yield what results, and why.[4]

Course Research that *Deductively Improves* Theory

The second circumstance is where well-researched theories pertaining to a field of management already exist – theories that need to be improved through anomaly-seeking research. To illustrate how cases can be usefully employed to teach and build theory in this circumstance, we'll offer a personal case study of the first author's attempts to build a course around his research on innovation. Along with Bowen's work, Christensen's experiences with this effort were pivotal cases in the distillation of this theory of course design and teaching.

The default mode of course architecture at the Harvard Business School for 50 years has been *inductive* in character. As described above, there was little management theory when the case method of teaching was initially developed. Just as with Professor Bowen's course, this worked well – it was the right method, given the circumstance. In the manner described by Schein (1987), a strong culture emerged at HBS that case-based instruction in an inductive architecture is the best way to teach.

Christensen was assigned in 1997 to head Harvard's required MBA course in general management. Guided by Harvard's culture, he architected the course inductively and infused it with cases that he and like-minded colleagues had written that described the problems of innovation, strategy and operations from the point of view of general management. Case by case, he attempted to lead his students inductively to discover well-documented frameworks and models that prior scholars already had discovered and published in academic journals. The course was an unmitigated disaster. Students could tell that Christensen already had the "answer." In his attempts to orchestrate a sequence of inductive case discussions, it seemed to them that the professor was asking the students to guess what was on his mind. The students hated it – and as a consequence the faculty hated teaching it.

In the midst this misery Christensen realized that he was in a different situation than the ones in which Bowen and Harvard's early masters of case instruction had found themselves. There already was a strong body of descriptive theory in the field. This suggested that a *deductive* course architecture, where the course design started at the third stage of the funnel could be more appropriate. Cases could be used to help the instructor and students together *test* theories in hopes that anomalies would emerge. So Christensen took the *same* material that had been used inductively and disastrously in the General Management course, and deployed it in a course named Building and Sustaining a Successful Enterprise (BSSE) whose deductive architecture was appropriate to the circumstance. The BSSE course has become quite successful with its deductive architecture.

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[4] The information about Bowen's course comes from the first author's personal interviews with Professor Bowen, and his observation of Bowen's activities.

For each class, students must read two documents to prepare for the discussion. The first is a paper that summarizes a theory about a dimension of a general manager's job. This is the primary reading. The second is a case about a company facing a problem that is relevant to that theory. In class discussions, students look through the lens of the theory, to see if it adequately explains what historically happened in the company. They use the theory as the basis for recommending what management actions will and will not lead to the desired outcomes, given the circumstance the company is in. And they search for phenomena in the case that the theory cannot explain.

For the next class, students are given a paper summarizing another theory that applies to a different dimension of management, and a case about a company whose predicament is relevant to that theory. Students first examine the case through the lens of the reading assigned for this class. Then they must pick up the theories that they used in prior classes, and put them on, like a set of lenses, to see what additional insight they can get about the cause of the company's problems and what can be done to resolve them. The students do this again and again – so that by the end of the class they have a significant arsenal of theories that they can employ to understand a company's problems in all of its dimensions, and predict the results of alternative courses of managerial action. And they have a lot of practice using the theories, as the analysis and discussion of the cases simulates their real-world application.

As an example, for one class session BSSE students read a book chapter summarizing the model of disruptive innovation as the primary reading (Christensen, 2003). We also assign a case, "Continuous Casting Investments at USX Corporation" (Christensen 1991). The case and reading describe how steel minimills such as Nucor entered at the bottom of the market selling rebar, and then moved upwards. USX retreated from the attack, market tier by market tier. Until he began teaching in this way, Christensen's writings on the topic had asserted that the mechanism *causing* disruption was that the leading companies had to respond to the needs of their best customers in order to survive. In the first year of leading a class discussion around this pair of readings, however, one student said, "When you say that listening to you customers is the cause, I don't think you've gone deep enough. I think the fundamental mechanism that causes the disruptors to move up-market is the pursuit of profit. And what causes the disruptees to flee up-market is the pursuit of profit." She was right. The student taught the professor a profound insight about his own theory.

A couple of years later, Christensen asked his students why USX was trying to "cram" minimill technology into its existing mills, rather than building a greenfield minimill as Nucor had done. Christensen asked this question sincerely: He didn't know the answer. He put a chair in the middle of the room to represent the USX CEO and another representing Nucor's, and asked, "What dimensions of the world look different from these points of view?" Again, the discussion produced an astonishing insight. Both CEO's had been taught in their finance and economics courses that they should ignore sunk costs and just consider the marginal cost and profits from alternative courses of action. By following this rule, the marginal cost of leveraging his existing mill infrastructure was *much* more profitable to the USX CEO than was the full cost of building a greenfield minimill. To Nucor, however, there was no existing mill infrastructure to leverage at the margin, so building a new mill was judged to be most profitable. As a class we realized that the doctrine of ignoring sunk costs and focusing on marginal costs and profits was being taught in their finance and economics courses as a universally applicable principle – there was no circumstance-based categorization scheme in that theory. So the students and professor together developed a categorization scheme for it: When the capabilities and infrastructure you've put into place to succeed in the past are those you will need in the future, then the marginal cost doctrine pertains. But if new capabilities and infrastructure are needed to thrive in the future, then the marginal cost analyses that cause managers to leverage the old are inappropriate. This insight formed the basis for a highly regarded article that the BSEE faculty subsequently published (Christensen, Kaufman & Shih, 2008).

The required macroeconomics course at the Harvard Business School, BGIE, also uses cases in a deductive architecture. Students look through the lenses of well-researched theories to examine case studies of different countries' economic problems and achievements – to analyze why things happened as they did, and what policies will and will not lead to the desired outcomes. Even in an introductory course, students can be taught what the theory is, and then learn how to use it through the deductive method of case learning.

Discussion: Courses as Theory-Building Enterprises

Note that both of the courses described above enroll the students in building better theory and using it. They differ only in their starting point. Bowen's BRSB course used cases inductively to build a body of understanding in a field where little had been written. The BSSE course started at the middle of the funnel with already-researched models as its starting point. In both courses, the cases are deliberately multi-faceted, written to highlight multiple perspectives on a problem and outcomes for which the reigning theories might not account. Indeed, they feature problems that the professors themselves do not fully understand. As a result, students often discover an anomaly in these complicated cases that faculty researchers had not seen before. This enables the faculty and students to revisit the crispness of definitions, the categorization scheme, and the associated statements of correlation or causality in the theory.

There is a third circumstance where a theory is so completely developed and tested that there is little potential improvement in the theory. Lecture-based course architectures might be appropriate to this circumstance. Rarely is this the case in management education, however. We have found that even when well-accepted theories are employed in a deductive architecture, case discussions that enroll students as research associates can surface puzzling anomalies. Questioning the sufficiency of the categorization schemes in the theories we study is almost always a productive path for building better theory. "When and why might this not work?" and "Under what conditions might this gospel be bad news?" are simple questions that can yield breakthrough insights. In the process, the students can help the instructor refine categorization schemes to yield more accurately predictive circumstance-contingent statements of causality. The instructors often feel they learn more from the class discussions than the students do. Indeed, the funnel diagram in Figure 1 was suggested by an MBA student in the BSSE course, Wrede Petersmeyer.

Entire courses need not be structured in the same way. A junior faculty member, for example, might design four to six class sessions for course research related to her research interests, and populate the rest of the course with material published by others. Regardless of the source of material, however, professors can *always* learn from students if course research is their mindset.

A prescriptive theory is a statement, based upon a body of understanding, of what causes what, and why. This means that consciously or unconsciously, our students are going to use theory every time that they make plans and take action as managers. A deductively architected course helps them learn how to use theories that stem from the research and writing of others. Inductively architected courses can help them be capable *developers* of theory – because, like it or not, whenever we draw a lesson from our experience, we are building a theory. Our hope is to prepare our students to be capable builders and discerning consumers of theory – to build an instinct for knowing when they can and cannot trust that the recommendations of an author, consultant or subordinate will produce the needed impact, given the circumstance that they are in. The skill to learn the right lessons from experience, and to apply them in circumstances where they are appropriate, is perhaps the most valuable ability that our students might take from our tutelage.

Summary

We have come to believe that instead of compartmentalizing research and teaching into separate realms, it might be more productive to think of teachers and students as partners in a collective enterprise of building, improving and using management theory. We hope that this paper can constitute the beginnings of a funnel of its own – a prescriptive theory of course design. Case studies can comprise a solid foundation for theory-building courses because they can be structured to display the phenomena in all its complexity. Instead of a descriptive categorization of case-based vs. lecture courses, we propose that faculty find themselves in one of two circumstances. The first comprises situations where instructors need to *develop* theory. The second circumstance is when instructors hope to teach theory, improve it, and help students practice its use. We propose that it might be helpful to begin referring to our classroom activities in these two circumstances as *course research*.

The entry stage of the funnel of prescriptive theory that we propose is a statement of causality: What enables managers to be effective is the ability to use the appropriate theory or model, given the circumstance in which they find themselves, that will allow them accurately to predict the result of the actions they plan to take. They will be more effective managers if they are discerning consumers of theory – if they can tell an invalid and unreliable theory from a valid, reliable one, and know how the tools they employ to become successful must differ by circumstance.

For those steeped in the gospel of sample size, it will seem audacious that we propose a theory of course architecture that is extracted from a few case studies – all of which are tainted by the subjectiveness of personal experience and observation. But as noted above, all data are subjective, and what makes a normative theory externally valid isn't sample size, but getting the categories right.

We aren't finished, of course. We simply hope that these concepts can provide willing faculty members with a start. As they use these statements of cause and effect, we hope that most of them find that the statements of causality actually *do* lead to the creation of better theory and more productive learning by students and faculty. We can expect, however, that anomalies will arise, as researchers follow these methods and fail. When this happens, we invite them to publish a paper about the anomaly – focusing on what it was about the circumstance of their research that caused the causal mechanism we have described here not to work. It is only by doing so that we can approach a better understanding of what methods of research and teaching can most predictably yield the most insightful theories and the best-prepared students.

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