Theory into practice: An essay reflecting on six years

of teaching evidence-based management to undergraduates

Abstract

Teaching management is challenging; teaching in work-related and theoretically informed ways corresponds to my specific and challenging goals. Over six years at <redacted> I taught an upper-year, undergraduate class in evidence-based management. This course was designed in relation to a range of practical problems that I believe novice managers are most likely to face. This paper describes the designed features of my course and their theoretical underpinnings, and discusses what I learned. Specifically, I observed natural links from social science to evidence-based management, gained insight into the level and type of methodological content required in preparation for evidence-based management practice, and developed a greater appreciation for how students search and filter evidence. The contribution of this essay is to both motivate and equip others to engage in this powerful and creative form of management education.

Keywords: (management education, evidence-based management)

The first meeting of <course name redacted> usually started with what television writers call a "cold open." As I arrived, conversation died down, as the experienced upper-year undergraduates waited for the customary distribution of the syllabus. Instead, they heard the following:

> Every morning I get dressed in the dark. [Nervous laughter: We can tell!]. My sock drawer contains seven black socks, five brown socks, and three white socks. What is the probability that I will show up to teach on any given day wearing a matched pair of socks?

After setting the problem, I sat down and waited patiently for something to happen.

This problem was the deliberately designed opener of the course. It served multiple purposes. Beginning the course in this way sent a signal that our learning experience would be fundamentally different, and that habitual responses like passivity and distraction would not tend to be effective here. Further, it created an opportunity to immediately think and discuss situations, assumptions, problems, theory, and prediction. After some initial struggle – also useful – we usually found ourselves talking about sampling without replacement and tree diagrams. Then I would typically say something like this:

> What if you wanted to be mischievous and change the probability of me showing up in a matched pair of socks? Suppose we say you can add only a single sock to the drawer, and it must black, brown, or white. What color sock would you add to increase the probability of me showing up in a matched pair? What would you do if you wanted to reduce the probability of this happening?

This drove the class into a discussion of representing the problem in ways that allow us to show the effect of changing the starting conditions. Alternatively, I might suggest that a child could argue that the probability is 50%, because my socks will either match or they won't match. How, I ask the class, could we contend with this sort of personal logic?

Typically, the response to this question relied on probability theory, recollected from a previous course.

Of course, some students protest, the socks problem takes place in a toy world and yields to basic math. In organizational behavior and human resource management, we are concerned with people, and their behavior is complex and hard to predict. I agree! This reveals the purpose of the opening exercise: to begin to understand and reflect on the nature of problems and problem-solving in general, as a precursor to moving on to a range of specific behavioural problems in management and organization.

Alternatively, I could have launched the course with something more fundamental, based on canonical references like the opening chapter "What is thinking?" in Baron (2000); some highlights from Simon, including the story of the ant, foraging in a complex environment (Simon, 1996, p. 51); or selections from Hastie and Dawes (2001) or Bazerman and Moore (2009). Most management students are somewhat familiar with theorizing in the heuristics and biases tradition as well as concepts like bounded rationality and satisficing. This would represent a natural, theoretically informed way to introduce the general topic of how managers make decisions.

However, my choice was to start with a "cold open" to increase the cognitive load (Plass, Moreno & Brünken, 2010) of the course, from the outset. Under this theoretical perspective, working on problems like "socks" makes greater demands on learners (imposes higher cognitive load), which supports the construction of memory structures, or schema. The challenge for me, and for instructors generally, is to ensure that the increase in load is "germane," or related to schema construction, rather than "extraneous," which detracts from this process. At the start of the course, working with a

stylized problem like "socks" provides reasonable prospects of success and keeps extraneous load under control, particularly when we focus on the problem-solving process rather than the solution, consistent with cognitive load theory. The chief benefit of this approach, under the theory, is that the construction of knowledge structures frees-up cognitive resources, which allows us to move to increasingly complex problems as our thinking develops and the course unfolds.

An added benefit of "socks" is that it supplies a reference point for discussions later in the course on problem identification and representation, as well as probabilistic reasoning. These are important concepts in Organizational Behaviour and Human Resources Management, where behaviour is often explained as a function of multiple, often interacting causes, and findings are typically expressed in ways that include an element of uncertainty. We require conceptual tools for thinking that help us cut through to the core of the problem, however it is presented to us. "Socks" is a way to dramatize the usefulness of tools for thinking that help us represent and solve problems. With that, my course in evidence-based management is under way.

Problems that novice managers may typically face

The design of my course in evidence-based management is based on a typology of the kinds of practical, behavioural problems that novice managers are likely to face, and general forms of evidence that bear on these problems. I constructed this typology iteratively over time, by considering my personal experiences as a novice manager under the critical incidents technique (Anderson & Wilson, 1997); by consulting O*Net (United States Government Department of Labour) for data on knowledge, skills, abilities and other characteristics of employees in entry-level management positions; and by

considering the capabilities of my students from the perspective of competitive advantage of firms (Barney, 1991). Under Barney's perspective on competitive advantage, I specifically considered the valuable, rare, and inimitable competencies that firms may be organized to exploit. These include knowledge, to be sure, although knowledge is probably a source of parity more than advantage in the market for new managers. Analytic skills and competencies, through which a prospective manager can apply knowledge to identify, represent, and solve problems, are probably more valuable and more rare than knowledge, by itself. In this way Barney's theorizing directed my attention to worthy goals for my course that would enable my students to compete and succeed in the labour market for entry-level managers. By consolidating information from all of these sources, I developed a typology of problems that novice managers face, which is summarized in Table 1. The typology encompasses these kinds of problems:

1. Answering fairly direct questions about management and organizations. Responses to these questions are based on theory or declarative knowledge. For example, what are some advantages of the matrix as an organizational form? Is the interview a useful selection tool?

2. Engaging in critical thinking, as when a proposed solution or intervention is described and a novice manager is asked for input. Responses to these sorts of problems are based on application of knowledge described in (1), together with a range of practices in critical thinking, including basic principles of logic, the construction of valid arguments, and the detection of fallacies in reasoning (Chaffee, 2004; For detailed application to management education, see Smith, 2003), as well as practical

considerations. Extending this approach, novice managers may provide alternative solutions that better correspond to organizational goals. For example, is a pay-for-performance scheme suitable, under some particular circumstances? Should our top management team go white-water rafting, in order to improve its effectiveness? If these proposed interventions are unsuitable, then what?

3. Responding to situations in which effects are observed, but causes are complex or unclear. Responses to these problems are based on reasoning about cause-and-effect relationships, and applying in-depth understanding of causes, antecedents, moderators, and responses to common organizational and management problems. For example, consider an instance in which historically high-performing new product development teams manifest a sudden drop in performance. What possible mechanisms for this decreased performance are most likely, and how might we best respond, in this situation, based on what we know? What more do we need to know in order to respond in an informed way, and how could we obtain and interpret this information?

Overall, the categories within the typology increase in uncertainty and difficulty, moving from (1) to (3). The typology is not comprehensive or definitive, but it has been useful as a point of departure for thinking about the students and the course.

A review of the literature:

What exactly do we mean when we say evidence-based management?

My work on the typology of problems faced by novice managers coincided roughly with two important milestones in the nascent evidence-based management movement. Jeffrey Pfeffer and Bob Sutton published *Hard Facts* (2006), which sought to provoke managers about some of their current habits and encourage them to consider and ultimately adopt evidence-based practice. Concurrently, Denise Rousseau launched the evidence-based management collaborative at Carnegie-Mellon University. This group met on multiple occasions to work together towards increased consensus around the practice of evidence-based management, broadly conceived. The work of the collaborative culminated in the publication of *The Oxford Handbook of Evidence-Based Management* in 2012. This volume collects chapters that detail the implications of evidence-based management for research, teaching and practice, as well as critical perspectives.

Evidence-based management is an approach to practice that is perhaps best described as actively under development. It is inspired by evidence-based medicine (Sackett, Rosenberg, Gray, Haynes & Richardson, 1996) as well as evidence-based practice in other fields, including public policy (Pawson, 2006; Cartwright & Hardie, 2012). Philosophically, the drive to provide more transparent, rational grounds for professional practice can be traced to an Enlightenment sensibility, and is manifest in medical history in John Snow's epidemiological work on cholera and Semmelweiss's seminal contribution on hand washing and the germ theory of disease.

More recently, the growth and development of the management form of this approach is reflected in the contributions of Rousseau (2006); Briner, Denyer and Rousseau (2009); Graen (2009); Briner and Rousseau (2011); Baba and HakemZadeh

(2012), and others. To summarize, perhaps the central feature of evidence-based management, presented in Briner, Denyer, and Rousseau (2009), is a consequence of Drucker's insight that most management problems are "repetitions of familiar problems cloaked in the guise of uniqueness" (p. 21). By implication, this means that there is a basis for learning in management practice: We can expect to benefit by applying systematic knowledge and understanding of the past to current and future problems.

To be clear, the application of systematic knowledge, also described as evaluated external evidence, is not absolute. Proponents of evidence-based management (e.g., Briner, Denyer & Rousseau, 2009) have been careful to condition the application of systematic knowledge on additional elements of practice, including managerial judgment and experience, stakeholders' interests, and context (which encompasses local evidence (Pfeffer & Sutton, 2006), or data that is collected, analyzed, and interpreted within a particular organizational setting).

Currently, these additional elements of evidence-based management, which are held to bear directly on manager's decisions, are elaborated within the literature of evidence-based management to varying degrees. For example, considering managerial judgment and experience, it is clear and uncontroversial that these elements contribute in a meaningful way to management practice in general (Cyert & March, 1963; Mintzberg, 1973 refers). At the same time, the psychological literature of judgment and decision-making provides a detailed catalogue of the ways in which our thinking and deciding can go awry. Knowledge of these mechanisms and the resulting biases and errors, thoroughly documented in places like Kahneman (2011) and Yates (1990), helps to identify some

specific liabilities and limitations of managerial decision-making and suggests

opportunities for making better decisions (Larrick, 2009).

In contrast, the contribution of both the stakeholder perspective and context as

additional elements of evidence-based management is arguably less well developed.

Although ethical and socially responsible management practice is in the forefront of

contemporary management education in many ways, the major discussion of stakeholders

in the *Handbook* occurs in Hodgkisson's (2012) critical piece, which argues that

evidence-based management neglects substantive consideration of power and politics as

major influences on organizational decision-making. Similarly, even as the field of

organizational behaviour has demonstrated interest in organizational context (Johns,

2006), and we can provide interesting illustrative examples (e.g., Ryan and Tippins'

(2004) argument that contextual factors should play a greater role in applying theory of

personnel selection to practice), we lack a sufficiently clear and general theoretical

perspective on context to move very far beyond the assertion that context merits active

consideration in mapping findings onto practice. Overall, the "four elements" approach

advocated in Briner, Denyer, and Rousseau (2009) explicitly argues that the contribution

of each of these elements to management decision varies, according to circumstances.

While this position represents a reasoned and pragmatic view, it simultaneously gives rise

to the problem of knowing the proper contribution of each element, across a range of

management decisions and circumstances.

Returning to the matter of the evidence, evidence-based management is in general

closely aligned with quantitative, behavioural science based perspectives on management

and organizations, which is perhaps a manifestation of its roots in evidence-based

medicine. However, the literature of evidence-based management also includes multiple, direct statements about the value of evidence derived from qualitative approaches (Rousseau, Manning, and Denyer, 2008; Briner & Denyer, 2012). Methodological perspectives on systematic reviews of the evidence like Pawson's (2006) realist synthesis, which draws on insights from a range of methodological orientations, have been characterized as exemplary evidentiary contributions along these lines. This broad perspective on evidence perhaps anticipates a source of critique that a narrow, exclusionary perspective on evidence quality leads to dogmatic practice and resistance to adoption. This is memorably parodied in the medical context in Smith and Pell (2003).

In practical terms, the availability and assessment of evidence is also an issue of ongoing interest and importance in evidence-based management. Evidence-based medicine responded to these problems structurally, by creating consolidated, high-quality evidence in the form of systematic reviews that are disseminated through institutions like the Cochrane Collaboration (Higgins & Green, 2008), and by explicitly discussing evidence quality, including creating a hierarchy of evidence that has diffused widely (Petticrew & Roberts, 2003). While it is not entirely clear that these sorts of approaches generalize directly to management, for a variety of reasons, there are advocates for the adaptation of lessons learned from medicine to the management form of evidence-based practice (Barends, ten Have & Huisman, 2012). Alternatively, it has been suggested that principles for assessing evidence quality can be derived and applied (Rousseau, Manning & Denyer, 2008) and that managers can respond directly to situations in which the evidence is unclear or possibly not applicable, in ways consistent with the spirit of evidence-based practice (Pfeffer & Sutton, 2006). We may also take a more nuanced

approach, arguing that the substantive question drives choice of methods (Petticrew and Roberts, 2003), as research design inevitably involves trade-offs.

In summary, evidence-based management is a work-in-progress. Foundationally, it rests on the assertion that in management there is value in applying the best of what we know (i.e, the evidence) to current and future problems. This is not an absolute prescription, however, as the evidence ought to be applied judiciously and after consideration of additional elements of decision, including judgment and experience, stakeholder considerations, and context. Among these additional elements, the application of judgment and experience to managerial decisions is arguably better understood than consideration of stakeholder concerns and the role of context. Finally, evidence-based management appears open to evidence originating from both qualitative and quantitative sources. Mechanisms for the diffusion of evidence into management practice, and for the assessment of evidence quality by practitioners, are underdeveloped, although innovations in evidence-based medicine may be broadly applicable.

Next, I will describe a few of the designed features of my course in detail. I will show how these features are linked to the previously described typology of problems faced by novice managers, and are informed by the current state of the literature on evidence-based management practice, as well as related principles from the learning literature.

Designed Features of the Course

The following summary of my undergraduate course in evidence-based management is organized by content, or what we covered in the course, and form, or ways in which this content was delivered. The framework for the course includes the following principles:

a. the course is designed to help prepare novice managers for evidence-based

    management practice, and includes specific practice in skills that are described,

    explicitly or implicitly, in the literature of evidence-based management;

b. the design and delivery of the course is informed by relevant evidence from the

    literature of education, including cognitive load theory (Plass et al, 2010),

    adaptive expertise (Hatano & Ouru, 2003), and desirable difficulties (Bjork,

    2009); and

c. the course capitalizes on opportunities to extend and refine current thinking on

    evidence-based management practice.

In the material that follows, this framework will inform specific points raised throughout.

Content

At <redacted>, term-length undergraduate courses like this are typically taught

three hours per week, over thirteen weeks. The course has typically been divided roughly

into thirds, usually with slightly more time spent in the Core section, as described below.

The major sections of the course are presented in the following subsections (Table 2

refers).

Introduction

This portion of the course includes particular emphasis on research-based

evidence and, to a lesser extent, managerial judgment and experience. This emphasis is

based on the current state of the literature, which reveals that these are the grounds on

which evidence-based management practice is most thoroughly and strongly articulated.

Consideration of the evidence is a powerful place to start, because in my

experience students at all levels have been accustomed to thinking of declarative

sentences in their textbooks as articles of faith, rather than as claims resting on evidence and subject to criticism. This willing suspension of disbelief is an even greater issue in light of contemporary management books targeted to practicing managers: As Pfeffer and Sutton (2006, p. 32) succinctly put it, "the marketplace for business ideas is messy and inefficient." In this light, thinking critically about claims is an enduringly important skill, for aspiring evidence-based managers at all levels.

In consequence, we start in the course by presenting a sentence from an introductory OB text like this, a consideration of situation strength: "However, in strong situations, which have more defined roles, rules, and contingencies (e.g., routine military operations), personality tends to have less impact" (Johns and Saks, 2014, p. 45). Johns and Saks link this claim through an endnote to Adler and Weiss (1988), which provides a basis for more elaborated understanding and evaluation of the original claim. Tracing the citation trail and evaluating arguments in textbooks provides useful practice in evaluating claims and ensuring their correspondence to the evidence (Spellman, DeLoache, & Bjork, 2007). Explicit consideration of the coordination of theory and evidence is also consistent with an identified issue in the literature of applied reasoning: We often tend to reach conclusions and hold beliefs that are not quite consistent with the facts (Sá, Kelley, Ho & Stanovich, 2004). This occurs for a variety of reasons, including motivational ones (Kunda, 1990). Holding and defending beliefs inconsistent with the evidence is a fairly widespread and obvious barrier to evidence-based practice, which was documented in a memorable video on science education titled *Private universes* (1987).

Managerial judgment and experience is another important element of managerial decision-making, under evidence-based management, and it also receives consideration

in the introductory portion of the course. Here, students are assigned readings from Stanovich (2012), who describes exemplary reasoning in the discipline of psychology, and Risen and Gilovich (2007), who summarize errors in casual reasoning (as distinct from formal reasoning) and provide specific recommendations to improve individual thinking. These specific readings have been chosen because within the course, they are fit-for-purpose: they inform our understanding of selected topics in management decision-making, without overwhelming the students with the formulations of mathematical psychology or comprehensive integrative summaries of the literature. The practical effect of readings like these is to help students better calibrate their own judgment by exposing them to a sample of ways in which their thinking can go awry. It is true that more canonical readings in judgment and decision-making, including those described in the introduction, also inform this phase of the course, but they were not assigned as readings.

In briefly considering experience separately from judgment, in the course we also discuss an important problem: We never quite know the representativeness of the set of our personal experiences, yet we are eager to generalize. This is the problem of small sample sizes in statistical reasoning. Here, I sometimes describe prototypical new salespeople, who believe they are very unsuccessful in closing deals. Such a conclusion is likely biased by misperceptions of the true base rate of success, because in general our co-workers are probably more likely to report their personal triumphs to us than to advertise their failures.

Overall, the goal in the introductory portion of the course is simply to lay the groundwork for later learning, by thinking provocatively about the evidence and how

managers solve problems and make decisions, guided by specific, carefully selected

theoretical perspectives in topics like statistical reasoning and cognitive psychology.

Throughout this phase of the course, the scope of our discussion is carefully managed, to

avoid detailed digressions into areas like philosophy of science, epistemology, or

phenomenology. These are worthy topics in their own right, but they can produce

confusion and goal drift in a course as fundamentally pragmatic as this one.

Core

    This portion of the course includes a set of topics from the domain of

Organizational Behaviour and Human Resource Management where the evidence is well

established and there is fairly widespread agreement among scholars on key principles. I

also tend to prefer topics that support demonstrations of the practical consequences of the

evidence. Locke (2009) presents 33 such principles, each reported as the title of a

chapter. My experience is that presenting singular, novel findings, or highly contested or

discrepant findings, tends to be counterproductive. For example, in a couple of course

sections I taught from Mumford, Campion and Morgeson's (2007) thoughtful and

interesting paper on the leadership strataplex, which provides evidence to illustrate how

the demands of leadership vary across organizational levels. Understanding the statistical

methods of the paper, including confirmatory factor analysis and MANCOVA, seemed to

crowd out an appreciation of its substantive findings, which some students felt were

largely intuitive in any case. The students also struggled to situate this specific finding

within the larger body of evidence encompassed by the leadership literature.

    Following these preferences for convergent bodies of evidence, established

principles, and practical implications, the set of topics typically presented in the core of

the course includes personnel selection, motivation and incentives, social context effects, and teams. These topics work, I believe, because two or three well-supported and useful principles within each of these topics can be explained in an hour or less, which leaves time to practice applications and to consider some finer points. Principles are useful because they can be thoroughly taught and learned and because they generalize.

Over the years, additional topics like emotions, leadership, organizational justice, structure, and power have also been included, often at the urging of students, with varying degrees of success. It is difficult to explain why some topics seem to succeed more than others, because topics are confounded with particular readings and exercises, as well as the preferences of sections of the course. It is possible that some topics fail in the context of the course because they seem remote from the kinds of practical problems summarized in the typology, or because the theory of the topic is underdeveloped or equivocal, making use of the topic in this course premature.

In general, it seems that research findings have value for the practice of evidence based management when they form a reasonably convergent body of knowledge that supports principles that create a basis for taking informed action, in relation to typical sorts of issues and identified problems. "Cutting-edge," highly abstract or conceptual findings, inadequately motivated gap-filling in the literature, and studies that depend on high statistical and methodological complexity are less useful for our purposes, effectively because they consume more resources in explanation than they provide in applicability.

Practice-related topics

These include guests, program evaluation, and influencing the organization (in the latter, inspired by Cialdini, 2008). Guests who give presentations and inspire lively and question-and-answer sessions are particularly valuable, because they often stimulate thinking and challenge conventional reasoning. For example, I once hosted a practicing manager who was a determined and vigorous advocate of the bias to action. After she left, her remarks sparked an informative discussion that touched on the difference between bias and error, and on the risks and rewards of deferring action for various reasons. The discussion in turn created a space for students to reconsider a popular misconception that managers ought to act decisively at all times, because to deliberate or defer action was to invite disaster and signal weakness.

Program evaluation is a very useful session that speaks to the important practical problem of validating the interventions that we propose. I also took Pfeffer and Sutton (2006) as a point of departure and built a session on what to do in the absence of validated external evidence. The core of this session is the logic of experimentation, together with basic methods for obtaining insight from observational data. The specific aims of this portion of the course are consolidation of learning, and anticipation of practice. A late development in the course was the allocation of some portion of our final meeting to the task of deriving specific, actionable principles for practice. As a final exercise, this provides a practical demonstration of what has been learned in the course.

Form

Making choices of how to best deliver identified content is the second pillar of the design of the course. In truth, content and form have evolved iteratively over the life-cycle of the course. The following are some of the major choices (Table 3 refers):

Textbook

I have taught versions of the undergraduate evidence-based management course from core resources like Pfeffer and Sutton (2006), Pearce (2009), and custom readers, which include a range of articles and chapters corresponding to specific topics. As a supporting text, Locke (2009) has also proven useful in two ways: it is a reference that summarizes and integrates current thinking on a range of practical concerns, and a source of pointer knowledge, or references that guide students more deeply into the literature, toward responses to related questions and concerns.

But my personal view is that custom readers are optimal texts for a course like this, because they allow me greater freedom to choose a set of readings that matches course goals and to adjust these choices over time. Course readers also support a discussion early in the course around why particular articles were chosen, which represents a valuable opportunity to model critical thinking about evidence. Typically, the guiding principle here is that choices are made because of the evidentiary value of readings (e.g., Schmidt and Hunter, 1998). But articles and chapters that ably meet this requirement *and* explain important concepts particularly accurately and clearly (e.g., Latham, 2009), or show sensitivity to important contextual features of organizations (e.g. Ryan and Tippins, 2004), also make their way into course readers. I also keep a supply of general and specific texts and reference books on hand for student use, to help groups build presentations and to inspire those struggling with understanding specific issues. Overall, my sense is that there is no single book or resource that maps onto the design for the course that is described here. This is an opportunity rather than a problem, however, as these sorts of situations inspire creative, workaround solutions.

Student group presentations

Mindful of the incomplete understanding of past learning that students bring to this course, I designed student group presentations as a method of reminding ourselves of the most important and valuable aspects of what we once knew about a core topic. The focus is quite specific: what can we take from prior experience with the literature, usually in the form of a small number of principles, that will help us respond to organizational messes and problems in an informed way? This focus ensures that the presentations are not merely spoken summaries of chapters in an introductory text, presented by rote. They often rise to the level of carefully designed, student-driven events with clear goals that prepare everyone in the class to better understand something in the evidence-base, in the interests of future application.

By way of illustration, consider a potential topic like motivation. Conventional treatments of work motivation in Organizational Behaviour texts provide exhaustively detailed treatments of content and process theories of motivation, including much material that a reasonable reader could only conclude is provided in the interests of archival piety. In contrast, a course presentation on motivation might respond to the initial question of what is most important and valuable here by deciding to focus on goal setting theory, which has substantial evidentiary support. From Latham (2009), the presenters could provide a clear explanation of the basics of the theory, including its widespread applicability, and elaborate specific mechanisms related to goal commitment and the distinction between learning and performance goals. They might conclude their presentation by engaging in an exercise designed to improve student performance in a challenging course.

The typical allocation of time for a group presentation is 60 minutes, with about 30-40 minutes for the presentation (which often includes an exercise) and the balance of time allocated to discussion. Presentations were evaluated on both content and delivery. A good presentation can inspire students to follow-up and deepen their understanding of a particular principle. A good presentation is a concerted effort to build knowledge and capability for later use. When this feature of the course this works particularly well, the collection of group presentation handouts is a useful précis of key principles embedded in various bodies of evidence.

In summary, invoking the frame of reference of evidence-based management sharpens the focus of the presentations by directing attention to a manageable number of well-supported principles that are worth understanding and remembering. This exercise in presentation design and delivery also exposes the limitations of much of organizational research, to the extent that it may fail to provide a basis for taking meaningful management action.

Report

The report, which is 8-10 pages in length, is the central requirement of the course, and was usually required three weeks prior to our final meeting. This gave me two weeks to grade the submissions, and some in-class time to talk about general strengths and weaknesses in the reports, at the level of the class. It is based on a small scenario, what Ackoff (1974) might call a mess, or what I sometimes describe as a pre-problem. These scenarios do not quite yield specific problems until we interpret them a little, asking ourselves questions about the essential features of the scenario and considering multiple possible problem identifications before arriving at a tractable problem.

These scenarios are based on the typology of typical problems faced by novice managers, specifically types (2) and (3) (Table 1 refers). This includes informed responses to proposed interventions as well as less well-defined situations in which effects are observed but causes are unclear. Problems based on (1) in the typology are addressed by quizzes and tests in the course, as they are comparatively simpler, and would tend to lead to more descriptive rather than analytic reports.

The scenarios I developed are deliberately incomplete and contrived to create a space for report writers to struggle, just a bit. In my view, this is a "desirable difficulty," as described in the learning literature (Bjork, 2009). The general mechanism here is that more problematized learning situations force learners to confront difficulties and complexity, which facilitates learning and sets favourable conditions for future, more advanced learning.

Here is example scenario, based on a request from the boss, as described in the handout distributed to students:

> I went to a presentation by a consultant this week who convinced me of the value of puzzle-solving exercises in selecting workers. I'd like to incorporate this predictor into our selection process for admin staff right away. Can you take a week and summarize what the current management thinking is, so I can sell this to the city's Chief Administrative Officer? If you have a different perspective on this, I'd love to hear it, as long as you make a clear, strong argument based on the evidence.

The incompleteness is important, because it provides a note of realism, as managers often decide under uncertainty and with incomplete information. In the course we prepare for the report by practicing, responding to multiple scenarios by breaking the task into manageable pieces, including problem identification, assumptions, principles, design of

the intervention, and validation. In many respects this is familiar ground: It is the classic rational decision-making model.

In the course, however, there is an important departure from the rational model on a particular point of emphasis. Inspired by some reading in problem identification and representation (Novick & Bassock, 2005; Pretz, Naples & Sternberg, 2003), I realized that in management education we often present students with well-defined, identified problems to solve, which neglects an important and comparatively understudied stage of the problem-solving process (Pretz et al, 2003). This stage includes finding the problem, describing it, and deciding whether it is worth solving. These activities precede rational decision model elements like designing courses of action, choice, and implementation. They are important because they direct our attention and determine the specific problem that is solved. In some cases, when the identified problem is difficult and complex, its representation can also support solving.

In the class I also provided multiple opportunities to practice, varying the features of problems to sharpen our skills, and considering both standard problems like how to hire and more novel forms, like how to hire for a job that has never been performed before. This approach is consistent with the literature of adaptive expertise, which details the responses of experts to nonroutine problems, based on a balance of efficient, well-learned problem-solving routines and more innovative approaches (Schwartz, Branford & Sears, 2005). In practice, problem-solving skills are built through repetition, varying surface and deep features of the problem, and gradually withdrawing supports provided to learners as they gain experience and insight. This method is supported by various

findings in scaffolding, expertise, and related learning literatures, which are collected and integrated for management education in Goodman and O'Brien (2012).

The methods of evidence-based management enable students to respond thoughtfully and effectively to the scenarios provided at the outset of the report. When this assignment is first introduced, some students are at a loss for how to proceed, and report confusion, anxiety, and frustration. This occasions many office visits, during which time I explain that thinking carefully about our work in the course makes these scenarios more manageable, and provides the basis for responding as an evidence-based manager. In the end, the report is a carefully contrived simulation of management practice: effectively, it represents a work sample for novice managers, a form which has been closely linked to work performance (Schmidt & Hunter, 1988).

Exercises with a purpose

In teaching organizational behavior there is nothing quite like a good exercise, which at best corresponds to the old writing exhortation to show rather than tell. The course incorporates many exercises for different purposes. These have included simulated meta-analysis, which provides insight into a common form in which quantitative evidence is summarized; very short social context of work scenarios, each of which corresponds to a theory or finding explained in Pearce (2009); and practice in responding to questions like "How will you know if it worked?" and "What will happen if you get this wrong?"   Exercises are often enjoyable and engaging, but the problem of missing the point looms: Many marshmallow towers have been built over the years, and many camping tents have been erected by blindfolded teams, but to what end? The remedy for this problem includes: ensuring exercises are grounded in theory; setting-up the exercises

and debriefing by clearly and explicitly connecting what happened to learning goals in the course; prototyping exercises and varying key features to provide insight into the mechanisms of learning in this form; and formally validating exercises to ensure they deliver actual learning.

The course has included some of these elements, while stopping short of formal validation of exercises, which is an admitted shortcoming. However, exercises in the course are informed by references like Huck and Sandler (1979), and Gelman and Nolan (2002), which offer many detailed, well grounded and artfully constructed exemplars; set-ups and debriefs are carefully designed and implemented, with specific reference to learning goals; and trial-and-error has been used to make instructions clearer and to supply more focussed prompts for discussion at the debriefing stage.

The preceding section summarized the essential elements of the content and the form of the course, as they have developed over time. Next, I will briefly summarize the local evidence that supports the effectiveness of the course, and discuss some highlights from my personal learning in teaching the course.

Discussion

I accept Erez and Grant's (2014) expressed reservation, concerning the difficulty of making strong claims for the effectiveness of a course like this in the absence of high quality evidence, at face value. Nevertheless, I do contend that a core of the designed features of this course worked. In other words, the preeminent general goal of the course, to prepare students for management practice, was met.

This conclusion is supported by information from multiple sources (Schmidt-Wilk, 2010). From the student perspective, the mean overall effectiveness rating, across

thirteen sections of the course from 2006-2012, was 5.95 on a 7-point scale, where a

rating of 6 corresponds to very good. These results are consistent with the winter term

2009 edition of the course, which was taught by my former teaching assistant <redacted>.

Qualitatively, students reported a clear contrast with other courses in the curriculum,

describing the course as "..relevant and interesting, and actually inspiring, which is rare

in a business class" and specifically commended the course for "…encouraging

independent critical thinking…" and being "…intellectually stimulating on the course

content." A 2007 peer evaluation of a session of the course by a colleague specifically

mentioned the value of the course for students, "on both a theoretical and an applied

level." The specific approach to teaching the course that was observed on that day [a

typical session in the core of the course] was described as "…innovative, engaging,

energetic, enthusiastic, and articulate." Overall, these student and peer comments on the

course are valuable because they are aligned with evidence-based practice, which

encompasses active and critical thinking, engagement with problems and principles, and

appreciation of both theory and practice.

Beyond these measures, I can also report that the quality of the discussion in class

often exceeded my expectations for management undergraduates. For example, one of the

social context of work vignettes I often used was designed to illustrate emotional

contagion. The vignette described a group of parachutists, waiting in the aircraft for a

signal to jump. Conditions were poor, and the most experienced parachutist in the group

was noticeably apprehensive. Emotional contagion predicts that fear would spread

rapidly in this group. A student asked if the process of emotional contagion would be

more rapid or have more severe consequences if the fearful parachutist was even more

experienced, or held higher in status within the group. In other words, does source status moderate emotional contagion? The emergence of a question like this from group discussion suggests a higher level of engagement and understanding than I typically experience in undergraduate courses taught under more traditional formats.

As the course instructor, I can attest that I learned a great deal as well. For example, I was impressed by the extent to which modeling the thinking processes of social science can help establish the basis for evidence-based management practice. These processes includes habits of mind like considering alternative explanations for observed effects, appreciating the importance of sampling in making inferences, and undertaking careful measurement. Thinking along these lines helps managers understand why performance within organizations varies across sub-units, why single vivid examples generally ought not to influence them as much as patterns revealed in large sets of observations, and why measures are not all equally informative. Social science as a frame-of-reference for evidence-based management has general implications as well. For example, on one occasion the class considered the effect of locking classroom doors at the start of large-section classes, as a policy intended to deter latecomers. This is a polarizing example, as students vary in their beliefs related to the importance of punctuality. However, a general social science perspective on behaviour in organizations, which sees behaviour as the product of some combination of ability, motivation, and situation, suggests that the instructor in this example has made a diagnosis that lateness is a motivational issue. Thus when students in the class vary in their ability to arrive on time, or aspects of the situation play a role (e.g., bus schedules) in constraining

behaviour, the practice of locking the doors seems potentially punitive rather than uniformly efficacious, which is a valuable insight.

The course further provides a useful window into the practice of evidence-based management itself. For example, one important issue in the course, with substantial implications for practice, is the problem of how much research methodology managers truly need to understand. Responses can be arranged along a continuum, anchored at either end by none (management scholars need to conduct and disseminate research translations in order to support evidence-based management practice) or all (managers need to read and understand the journals themselves). Based on my experience in the course, students aspiring to management need to understand some methods in order to evaluate the evidence they encounter. This learning seems to be most useful, however, when it is presented at the level of principles rather than in detail. To illustrate, the course incorporates discussion of why studies on the same relationships between the same variables often yield different results, and yet we can provide an estimate of population-level associations. This is in contrast to devoting a large amount of time to explaining the intricacies of techniques for quantitative syntheses of effect sizes. The preferred, principles-based approach is also consistent with a common caution provided to students that no single study is definitive, while providing an informed basis for this conclusion.

A related, applied issue occurs when students confront the literature, for example when they begin work on their reports. Experience in the course suggests that their general problem is not finding evidence, but searching efficiently and in the right places and relatedly, and screening search results. These specific concerns about obtaining access and evaluating evidence quality were previously characterized as something of an

open question, in the current literature of evidence based management. What is needed

here is a reasonable set of principles for quickly and accurately assessing evidentiary

value, embedded in a larger system that makes high-quality, validated external evidence,

in readable, summary form, directly available to managers. In the interim, we need to

provide some guidance for students in courses like this to:

a. construct search strings that use the correct, technical vocabulary keywords (like

    "human resource selection" rather than "hiring");

b. use additional keywords like "review" or "synthesis" in order to direct their

    attention to bodies of research rather than single studies;

c. search in places that will yield a high ratio of signal: noise in terms of results; and

d.   screen their results on the basis of quality, either by first principles like construct

    validity or effect size (Rousseau, Manning & Denyer (2008) or, perhaps less

    reliably, by proxies like generalized source credibility, including peer review or

    journal status.

When students attempt to reconcile competing claims in the literature that lead in

opposite directions (e.g., emotional intelligence), their efforts foreground inherent

difficulties in evaluation of the evidence by non-experts. This suggests a basis for direct

instruction in the course, reinforced by exercises, in order to help the students do more

than rely on assimilation bias, directional search, or flipping a coin in order to take a

reasoned position when confronted with a current controversies. Realistically, this may

be something of an advanced topic, considering the fact that such controversies exist in

the academic literature in the first place.

Returning to Erez and Grant's reservation, I do want more systematic knowledge about the "ground truth" of what's happening in the course, in order to drive learning and the acquisition of specific skills needed for practice. This starts with the application of validated evidence of teaching and learning to what we do in the course and how we do it, as detailed in this paper. It extends to establishing the construct and content validity of assessments in the course, conducting pre- and post-testing, and follow-ups with course members, in order to better understand how the course works, and where it fails. We may catch a glimpse of these effects in our courses by monitoring discussion, presentations, and grading; occasionally they are self-reported by learners, incidentally and in writing, at the end of the course and after the fact. We can certainly be more systematic about providing a stronger evidentiary basis for the effectiveness of our teaching, as a general rule. Teaching a course in evidence-based management practically requires us to take these obligations more seriously.

Conclusion

Over six years I have built a course that is designed to prepare undergraduate students to become practicing, evidence-based managers. The course is based on a typology of the kinds of problems novice managers typically face. The content and form of the course are jointly informed by literatures of learning and evidence-based management. The latter has some well-developed features, but it at the same time very much a work-in-progress, with some identified strengths and areas that require elaboration. Finally, I report qualified evidence in support of the effectiveness of the course, together with some lessons learned on the value of social science-inspired

thinking, insights into how students find and struggle to integrate evidence, and some views on how I would like to expand my understanding of "what works" in the course.

Teaching this course has been an ongoing education for me. Lately, I have been working with new audiences, including MBA students and practicing managers, and noticing similarities and differences in comparison to the undergraduates, whose work largely informs this paper. It is too early to be very systematic about this, but my first impression is that the similarities are more numerous and extensive than the differences. This is interesting, because in some ways it belies conventional wisdom about the preferences and abilities of graduate students and executives in comparison to undergraduates in management.

The course has also inspired me to look backwards in the curriculum, and to reflect on how we might better teach introductory courses, by focusing on the course described here as a transitional phase, leading to the end state of effective practice as a novice manager. We might change introductory courses in terms of content, by working on a smaller number of well-learned principles, and by focusing on practice-oriented skills, both conceptual and practical.

Overall, the work in this course has been inspiring. It has driven me to find new and effective ways to do meaningful, engaged work with students. The methods and strategies that I've described here do require some difficult and demanding work on the instructor's part, and there will likely be some pain in consequence. But the potential benefits, in my view, outweigh these costs. The lessons I have described here are in many cases hard-won, and I hope you find them useful.

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Table 1 – Typology of problems that novice managers are likely to face

Problem type	Examples	Applicable forms of evidence
(1) Answering direct questions	What are some advantages of a matrix, as an organizational form? Is the interview a useful selection tool?	Theory, declarative knowledge
(2) Critiquing proposed responses to identified problems	Is a pay-for-performance scheme suitable, under some particular circumstances? Should our top management team go white water rafting, in order to improve its effectiveness?	As (1), applied. Critical thinking, knowledge of suitable alternative responses with demonstrated efficacy.
(3) Diagnosing and responding to observed effects with complex or unclear causes	Our new product development teams have experienced a sudden drop in performance? What should we do?	Understanding of theory in terms of causal relations, including causes, antecedents, moderators, and outcomes.

Table 2 -- Major sections of the course

Introduction	First session includes "cold open" Research evidence Managerial judgment and experience Introduction to evidence-based management
Core	Typical sessions include: selection, motivation and incentives, social context effects, teams, Alternative sessions have included emotions, leadership, justice, power, structure
Practice-related topics	Guests Program evaluation Influence In the absence of research-based evidence
Summary & integration	Production of guidelines for practice

Table 3 – Major course Features

Text	Custom publication incorporating readings from various sources
Student group presentations	Related to prior learning; emphasis on extraction of actionable principles
Report	Individual, 8-10 pp report based on applying evidence-based management to a short scenario
Purposive exercises	Grounding in theory; set-up and debrief, linking to learning objectives are of paramount importance