Inside the Organizational Learning Curve: Understanding the Organizational Learning Process

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Michael A. Lapré

Vanderbilt University
Nashville, TN 37203
USA
michael.lapre@owen.vanderbilt.edu

Ingrid M. Nembhard

Yale University
New Haven, CT 06520-8034
USA
ingrid.nembhard@yale.edu

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Michael A. Lapré[1] and Ingrid M. Nembhard[2]

[1] *Vanderbilt University, Owen Graduate School of Management, 401, 21st Avenue South, Nashville, TN 37203, USA, michael.lapre@owen.vanderbilt.edu*

[2] *Yale University, School of Public Health & School of Management, 60 College Street, P.O. Box 208034, New Haven, CT 06520-8034, USA, ingrid.nembhard@yale.edu*

Abstract

In this work, we aim to provide an in-depth understanding of the organizational learning curve and why significant differences in the rate of learning exist across organizations. We review what is known about organizational learning curves as well as what is unknown. In sum, much is known and much remains unknown. Few studies have "stepped inside the learning curve" to provide greater understanding of the organizational learning process underlying the learning curve. We contend that this understanding is essential for helping organizations learn better and faster, and thus, operate more effectively and efficiently in a dynamic world. Therefore, not only do we examine what is known about organizational learning curves, but also what is known about the organizational learning process. Much of the former research has been conducted by operations scholars, while much of the latter has been

conducted by organizational behavior scholars. By integrating research from both (of our) disciplines, we hope to provide a more comprehensive understanding of organizational learning and the venerable organizational learning curve.

Contents

1

Introduction

The learning-curve phenomenon is widely known. As individuals gain experience with a task, they get better at performing that task. This observation is reflected in the oft-repeated adage, "practice makes perfect." The phenomenon of practice-makes-perfect has been observed not just for individuals, but also for organizations. As organizations gain operating experience, organizational performance improves, albeit at a decreasing rate. Wright [182] was the first to document this "organizational learning curve." He found that with every doubling of airframes manufactured, the amount of direct labor hours necessary to produce a single airframe decreased at a uniform rate. Since his study, in the vast majority of the literature, organizational learning has been inferred whenever organizational performance improved as a function of operating experience. Learning curves have been observed for several measures of performance in many different contexts. For example, Figure 1.1 shows an organizational learning curve for an airline learning to reduce customer dissatisfaction.

Interestingly, organizational learning curves show tremendous variation, even when organizations perform the same task. Some organizations learn fast, some learn slowly, and some do not learn

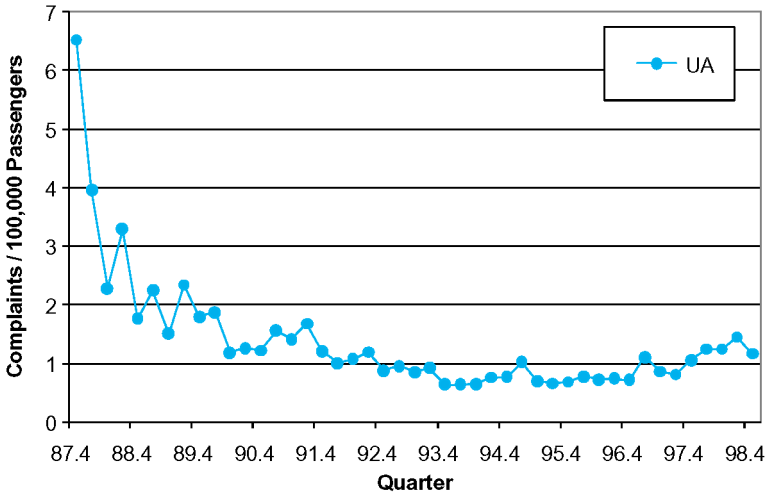

Fig. 1.1 The organizational learning curve: Customer dissatisfaction with United Airlines. *Note.* Customer complaints filed by passengers with the U.S. Department of Transportation.

at all. The extent to which organizations differ in performance of the same task is amazing. Research shows that productivity for the best performer in the insurance industry is three times that of the worst performer [168]. Similarly, a comparison of regional Bell telephone companies showed that the best performer had 50% lower unit costs compared to the worst performer. Furthermore, although most of the telephone companies learned to reduce unit cost over time, some increased unit cost [168], indicating not only a slow rate of beneficial learning for some, but also that harmful learning occurs. Chew et al. [32] studied over 40 plants in a commercial food operation, and found productivity differences on the order of 3:1. Even after controlling for characteristics such as age, size, technology, and location, productivity differences of 2:1 remained. The authors noted that, "discussions with managers and our experience with plant networks studied over longer periods of time suggest that plant-to-plant variation is not a transient phenomenon and in fact, has persisted for a number of years" [32, p. 16].

However, poor learning and performance need not persist. A study by Pisano et al. [137] demonstrated the positive potential of organizational learning. The authors investigated 16 hospitals that implemented a new

technology for minimally invasive cardiac surgery, and found considerable variation in learning rates, as measured by improvement in operative procedure time. The best hospital completed the surgery in 143 minutes after 40 cases, while the worst hospital required 305 minutes after the same number of cases. Strikingly, one hospital (Hospital M) started out slowly — almost 60% slower than the sample average. However, it caught up and surpassed the sample average, attaining procedure times that were 40% faster than the sample average, after 50 cases. The authors attributed the dramatic improvement to the hospital's use of deliberate learning activities and how they were performed.

Experts such as CEO Ray Stata of Analog Devices have argued that "the rate at which individuals and organizations learn may become the only sustainable competitive advantage, especially in knowledge-intensive industries" [157]. The rationale for the competitive advantage of learning rates lies in several trends. First, the rate of knowledge growth in many industries is astonishing. Consider the medical industry, in which over 10,000 studies are published annually about strategies to improve the clinical and operational effectiveness of health care delivery (Institute of Medicine, [81]). With such knowledge growth comes an imperative for organizations to quickly implement an abundance of new practices in order to better serve their customers. Second, organizational learning rates are important because of shorter product life cycles; the lead time for getting new products and services to market is decreasing, requiring organizations to learn to innovate faster. Third, many new ideas and technologies are complex; organizations must learn to apply them efficiently and effectively. Finally, the tremendous variation in performance across organizations creates an imperative for organization learning. To catch up with the highest performing organization, laggards have to learn faster. Likewise, if the highest performing organization wishes to stay ahead of the competition, it must improve at rate that is faster than the competition. Thus, every organization arguably has an incentive to learn as fast as possible i.e., to accelerate its organizational learning curve.

In this work, we aim to provide an in-depth understanding of the organizational learning curve and why significant differences in the rate of learning exist across organizations. We review what is known

about organizational learning curves as well as what is unknown. In sum, much is known and much remains unknown. Few studies have "stepped inside the learning curve" to provide greater understanding of the organizational learning process underlying the learning curve. We contend that this understanding is essential for helping organizations learn better and faster, and thus, operate more effectively and efficiently in a dynamic world. Therefore, not only do we examine what is known about organizational learning curves, but also what is known about the organizational learning process. Much of the former research has been conducted by operations scholars, while much of the latter has been conducted by organizational behavior scholars. By integrating research from both (of our) disciplines, we hope to provide a more comprehensive understanding of organizational learning and the venerable organizational learning curve.

We organize the remainder of this text as follows. To provide a foundation for our discussion, we begin by reviewing the definition of organizational learning (Section 1.1.) and where it occurs in organizations (Section 1.2). In Section 2, we shift attention to our primary focus — the organizational learning curve. We review various learning curve models, describing the measures of organizational experience and organizational performance that have been used to develop these models as well as the mathematical functions used to construct these models. We then summarize the evidence from these models; the evidence shows tremendous variation in organizational learning rates. Section 3 reviews frameworks for understanding this variation in learning rates and discusses variation that arises from differences in experience, deliberate learning activities, and other key sources. Section 4 examines the relative effectiveness of experience versus deliberate learning activities as sources of learning. We contend that these sources of learning affect performance through a process. Section 5 describes the steps that characterize the learning process inside the learning curve: From learning to better organizational knowledge to changed behavior to organizational performance. We discuss the significant challenges organizations need to overcome in order to advance along these steps.

Two decades ago, scholars called for organizations to become "learning organizations" [73, 149, 157]. Empirical evidence suggests that

many organizations have struggled to attain this goal [60]. We believe that this indicates a need for more research that aims to provide a better understanding of the organizational learning process and insights to guide organizations toward achievement of their learning goals. Thus, we conclude our discussion in Section 6 by outlining areas for future research that build on the admirable research that has been conducted. We believe that these areas are the next frontiers in organizational learning research. This research is needed because the imperative of organization learning has not diminished [50]. Instead, all trends indicate that the imperative continues to grow.

1.1 Organizational Learning: The Defining Elements

What does it mean for an organization to learn? There are several comprehensive reviews of the organizational learning process, for example Hedberg [74], Fiol and Lyles [58], Levitt and March [107] and Huber [76]. It seems that with every review, a new definition of organizational learning is offered. Table 1.1 gives only a sample of the definitions of organizational learning that scholars have offered.

Most definitions have three elements in common. The first element is a focus on the *organization*. A member of an organization can learn something, but if that learning is not captured at the organizational level, organizational learning has not occurred. Thus, organizational learning is different from individuals learning within organizations. The second common element of organizational learning across definitions is *better knowledge*. Organizations tend to have limited knowledge about why and how their actions produce organizational outcomes [84]. A critical part of organizational learning is enhancing the knowledge and understanding inside the organization. The third element is *improving actions*. The purpose of organizational learning is to facilitate changes in actions to produce better organizational performance. Implicit in most views of organizational learning is a fourth element: *ongoing effort*. Organizational learning is not a one-shot game. Instead, it is an ongoing process that should occur throughout the lifetime of an organization. Thus, integrating the common elements of organizational learning across definitions, organizational

Table 1.1. Some definitions of organizational learning.

Argyris [10]	Organizational learning is a process of detecting and correcting error (any feature of knowledge or knowing that inhibits learning) (p. 116).
Duncan and Weiss [46]	Organizational learning is defined as the process within the organization by which knowledge about action–outcome relationships and the effect of the environment on these relationships is developed (p. 84).
Hedberg [74]	Learning takes place when organizations interact with their environments: Organizations increase their understanding of reality by observing the results of their acts (p. 3).
Fiol and Lyles [58]	Organizational learning means the process of improving actions through better knowledge and understanding (p. 803).
Levitt and March [107]	Organizations are seen as learning by encoding inferences from history into routines that guide behavior (p. 319).
Stata [157]	Organizational learning occurs through shared insights, knowledge, and mental models ... [and] builds on past knowledge and experience — that is, on memory (p. 64).
Huber [76]	An entity learns if, through processing of information, the range of its potential behaviors is changed (p. 89).
Garvin [59]	A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (p. 80).
Kim [92]	Organizational learning is defined as increasing an organization's capacity to take effective action (p. 43).

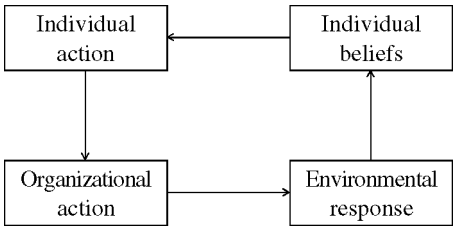

Fig. 1.2 The organizational learning cycle.
Note: Adapted from March and Olsen[116].

learning can be defined as the organization's ongoing effort to use better knowledge to improve its actions.

To better understand how organizational learning occurs, it is useful to review classic models by March and Olsen [116] and Kim [92]. According to March and Olsen's model (see Figure 1.2):

> At a certain point in time some participants see a discrepancy between what they think the world ought to be (given present possibilities and constraints) and

> what the world actually is. This discrepancy produces individual behavior, which is aggregated into collective (organizational) action or choices. The outside world then "responds" to this choice in some way that affects individual assessments both of the state of the world and of the efficacy of the actions (p. 149).

All four elements identified above in definitions of organizational learning are evident in March and Olsen's description of how learning occurs. While individual beliefs and actions play a key role, organizational action is different from individual action (the organizational element). Updating of beliefs — especially about action-response relationships — represents better understanding (better knowledge). By modifying behavior, more favorable environmental responses should be obtained (improving actions). Lastly, the cycle keeps repeating itself, hopefully yielding improvements over time (ongoing effort).

Kim [92] argued that there are two additional sub-processes within the learning cycle — conceptual and operational learning — that shape the first step in the learning process (i.e., the formation of individual beliefs). *Conceptual learning* consists of *assessing* cause and effect relationships that govern experienced events, and *designing* an abstract concept — a theory — to explain this experience. Conceptual learning is in essence trying to understand why events occur; it facilitates the acquisition of know-why. In contrast, *operational learning* consists of *implementing* changes and *observing* the results of these changes. Operational learning is basically developing a skill of how to deal with experienced events; it facilitates the acquisition of know-how. This cycle of observe–assess–design–implement, depicted in Figure 1.3, has several names in the literature. For example, Deming [44] called it the "plan–do–study–act (PDSA) cycle". As the following quote by Stata illustrates, it is challenging to obtain the right balance between conceptual and operational learning:

> I think to some extent, we jump back and forth between these two extremes of over-conceptualization and pure pragmatism because we don't have the tools to connect

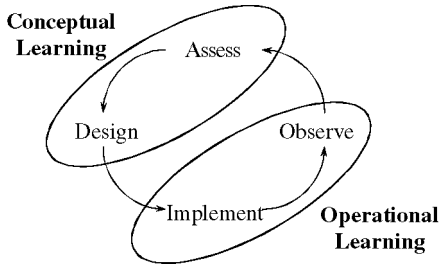

Fig. 1.3 Conceptual and operational learning Kim [92].

> them. The core challenge faced by the aspiring learning organization is to develop tools and processes for conceptualizing the big picture and testing ideas in practice. All in the organization must master the cycle of thinking, doing, evaluating, and reflecting. Without, there is no valid learning. (Stata quoted in Ref. [149, p. 351]).

1.2 Levels of Learning: Individual, Team, and Organization

As noted above, many of the definitions and models of organizational learning in the literature focus on the actions of organizations and the individuals working within them (e.g., [116]). However, there is growing belief that these conceptualizations miss a critical group of actors: Teams or workgroups. Teams consists of a group of individuals that exist within a larger organization, have a clearly defined membership, and are responsible for a shared product or service [65].

Some scholars have argued that teams and team learning are the primary vehicles of organizational learning for two reasons [49, 149]. First, an increasing amount of organizational work is performed by teams. Second, teams frequently serve as the context for organizational learning as most organizational actions are complex and require coordination among team members with different expertise [134]. As team members work together, they are able to engage in team learning. Team learning describes the activities through which members acquire, share, or combine their knowledge with the goal of adapting and improving

their work processes [4]. While there are many behaviors that may serve this purpose, three behaviors are consistently associated with team learning: Speaking up, collaboration, and experimentation [48, 130].

While the understanding of individual, team, and organizational learning has largely developed through separate streams of research, there is a growing appreciation that these three levels of learning, though distinct, are interrelated [35, 40, 92]. Moreover, the levels facilitate and depend on one another. Individual learning influences team and organizational learning. Likewise, institutionalized norms, procedures and routines at the team and organizational levels influence individuals' attention, thinking, capability, motivation, and actions [40].

In this integrated process, individual learning occurs as individuals make inferences about the relationship between their actions and outcomes based on their experiences. When the individual shares his or her lessons learned with other members of the organization, individual learning combines with the learning and interpretation of other group members to influence learning at the team level. As team members share their learning, they may develop a shared understanding of each other's experience, expertise, and perspective. This understanding can lead to the modification of current practice; effective sub-practices may be incorporated, while ineffective sub-practices are refined or replaced. Effective practice changes are likely to diffuse throughout the organization. As this happens, the organization learns and practices become institutionalized. The institutionalized practices then become the basis for new individual learning. Thus, learning is an iterative, multi-level process in organizations. Knowledge and practices move from the individual to group to organizational level. Learning at the organizational level then shapes how individuals and groups act and what they learn going forward [40, 92].

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