

*An Action Science Approach to Cultural Learning
in Urban Schools and Minority Serving
Institutions (MSIs)*

**Action Science: Central Tenets and Evidence of Its Influence in
the Extant Educational Literature**

Action science is the study of the gap between what people intend to do and what they are actually able to do in practice (Argyris and Schön, 1996). Research in this field aims to produce “valid generalizations about how individuals and social systems – whether groups, intergroup, or organizations – can (through [individual] agents) design and implement their intentions in everyday life” (Argyris, 1982, p. 469). Tracing inwards from an individual’s outward actions to discern the tacit beliefs and values informing them, action scientists begin with the premise that the “evaluations or judgements people make automatically are not concrete or obvious [but] abstract and highly inferential” (Argyris, 1990, p. 89). Chris Argyris – the organizational scholar whose seminal research established action science as a subdiscipline in the literature – identified some primary goals for the field with his frequent collaborator Donald Schön, including:

- Surface the underlying rationales individuals use to justify their reasoning processes.
- Understand the origins of underlying theories individuals use to make sense of situations or reach intended outcomes.
- Identify any contradictions in an individual’s reasoning processes that may diminish their effectiveness.
- Help individuals and organizations design action strategies for achieving valued organizational outcomes that better reflect their best intentions.
- Framebreaking, the process by which people learn to identify (and potentially change) the frames of reference they use to make sense of and act in their worlds. (Argyris, 1982; 1993; Argyris and Schön, 1996; 1997; Argyris et al., 1985)

Examining organizational members' implicit reasoning processes helps us understand how various interpersonal, social, and psychological influences shape the meaning-making processes they use to make sense of directly observable data in their organizational environments. Action scientists are primarily concerned with understanding how individuals develop what they call "theories of action," which "specify the behavior required to implement the intended consequences [and] describe the universe as it is with the intention of reconstructing the world as it should be" (Argyris, 1991, p. 351). Theories of action are strategies for maintaining control in situations that can be embarrassing or threatening; they are taught to us early in life and revised as they are implemented through action over the course of a lifetime (Argyris, 1990). They "can be understood both as a disposition of an agent and as a theory of causal responsibility held by an agent" (Argyris et al., 1985, p. 83).

Action science delineates between two types of theories of action. Individuals (and organizations) may state they are acting according to one set of beliefs – their espoused theories – but act in ways that implicitly contradict that set of beliefs, revealing the beliefs they truly value, which constitute their theories-in-use (Argyris, 1976; 1982; 1985; Argyris and Schön, 1974; 1996). Argyris (1993) later elaborated on how this concept represents a process through which humans convert knowledge to action:

Human beings are designing beings. They create, store, and retrieve designs that advise them how to act how to act if they are to achieve their intentions and act consistently with their governing values. These designs, or theories of action, are the key to understanding human action. (pp. 50–51)

Action scientists explore discernible discrepancies between espoused theories and theories-in-use to determine whether an individual is using one of two types of theories-in-use: Model I or Model II.

Tables 1.1 and 1.2 are reproductions of the tables action scientists reference to map out the "master programs" associated with each of these types of theories-in-use. Master programs are "theories of action that inform actors of the strategies they should use to achieve their intended consequences" (Argyris, 1993, p. 50). Both tables outline how an individual's governing values (also called variables; column A) motivate their actions (column B), which have consequences for their behavioral worlds (column C), for how they learn (column D), and ultimately for their individual effectiveness (column E). Argyris et al. (1975) elaborated on the nature of these consequences as follows:

Table 1.1 *Model I theory-in-use*

	A	B	C	D	E
	Governing Variable or Action	Action Strategy for Action and toward Environment	Consequences for Behavioral World	Consequences for Learning	Effectiveness
I I	Achieve a purpose as the actor perceives it	Design and manage environment so that actors are in control over factors relevant to them	Actor seen as defensive	Self-sealing processes	Decreased effectiveness
	Maximize winning and minimize losing	Own and control task	Defensive interpersonal relations and group dynamics	Single-loop learning	
	Minimize eliciting negative feelings	Unilaterally protect self	Defensive norms	Little public testing of theories	
	Be rational and minimize emotionality	Unilaterally protect others from being hurt	Low freedom of choice, internal commitment, and risk-taking		

Reproduced with permission from Argyris, 1992.

Table 1.2 *Model II theory-in-use*

A	B	C	D	E
Governing Variable for Action	Action Strategy for Action and toward Environment	Consequences for Behavioral World	Consequences for Learning	Effectiveness
Valid information	Design situations or encounters in which participants can originate and experience high personal causation	Actor experienced as minimally defensive	Disconfirmable processes	
Free and informed choice	Task is controlled jointly	Minimally defensive interpersonal relations and group dynamics	Double-loop learning	Increased effectiveness
Internal commitment to choices and constant monitoring of their implementation	Protection of self is a joint enterprise and oriented toward growth Bilateral protection of others	Learning-oriented norms High freedom of choice, internal commitment, and risk-taking	Frequent public testing of theories	

Reproduced with permission from Argyris, 1992.

Any action can have an impact on many governing variables. Agents typically must trade off among governing variables, because actions that raise the value of one may lower the value of another. Consequences feed back to action strategies and governing variables. Consequences may also be unintended and counterproductive. Consequences which are unintended may nevertheless be designed, in the following sense: action intended to achieve particular consequences may, by virtue of its design, necessarily lead to consequences which are unintended. (p. 85)

Behavioral worlds – discussed at length in Chapter 12 – are the “qualities, meanings, and feelings that habitually condition patterns of interaction among individuals within [an] organization in such a way as to affect organizational inquiry” (Argyris 1996, p. 29). Learning in this context is defined as “a process in which people discover a problem, invent a solution to the problem, produce the solution, and evaluate the outcome, leading to the discovery of new problems” (Argyris, 1982, p. 38); effectiveness is “the degree to which people produce their intended consequences in ways that make it likely that they will continue to produce intended consequences” (p. 83). Next, I briefly review central features of the master programs associated with each of these theories-in-use for reference as they appear throughout the book.

Model I Theory-in-Use

Individuals who use Model I theories-in-use are driven by four governing values: (1) achieving a purpose they perceive to be meaningful, (2) maximizing winning and minimizing losing, (3) minimizing eliciting negative feelings (one’s own and those of others), and (4) being rational and minimizing emotionality (Argyris, 1982; 1990). Model I-oriented individuals work to enact these values through four primary action strategies: (1) designing and managing environments so that actors are in control over factors relevant to them, (2) owning and controlling tasks, (3) unilaterally protecting oneself, and (4) unilaterally protecting others from being hurt. Argyris posited that these dispositions produce defensive interpersonal relations and group dynamics because the primary behavioral strategy Model I-oriented individuals use is to seek control over others and their environment. Individuals who seek unilateral control are less likely to receive valid feedback from their environments because they use self-sealing processes to avoid receiving information that might challenge their own beliefs and values. They also experience lower internal commitment, because their behavioral worlds promote little free choice and risk-taking

(Argyris, 1982; 1990; Argyris and Schön, 1996). When learning occurs amidst these defensive norms – either intrapsychically within the actor or between the actor and the environment – Model I theories-in-use are concretized through processes of single-loop learning. Argyris (1982) described how Model I behavioral worlds inhibit learning as follows:

[Individuals] will not seek feedback that genuinely confronts their actions, and those controlled will tend to play it safe (they are not going to violate their governing values and upset others – especially if the others have power). As a result, many of the hypotheses or hunches that people generate will become self-sealing or self-fulfilling. Moreover, whatever learning people develop will tend to be within the confines of what is acceptable. This is called single-loop learning because the actor learns only within the confines of his or her theory-in-use. (p. 88)

By “within the confines” here, Argyris means that the individual is engaging in learning in which they are correcting their mistakes without changing the governing variables (values) driving their actions (Argyris, 2002). Single-loop learning is also problem-solving without reflection on how organizational norms and values are contributing to recurring challenges; it is as a “single feedback loop [that] connects detected outcomes of action to organizational strategies and assumptions which are [then] modified to keep organizational performance within [a] range set by organizational norms. The norms themselves remain unchanged” (Argyris and Schön, 1978, pp. 18–19). Single-loop learning does not generate transformational change in organizations, but it does help leaders develop routinized responses to persistent challenges within and external to the organizational environment – thus optimizing at least the efficiency of their internal processes if not their organizational effectiveness. Model I theories-in-use are said to decrease the individual’s effectiveness because people of this orientation do not question or challenge the governing values driving their challenges, which inherently delimits their abilities to develop permanent solutions.

Model II Theory-in-Use

Model II theories-in-use are driven by three governing values: (1) valid information, (2) free and informed choice, and (3) internal commitment to choices and constant monitoring of their implementation. Model II individuals use four action strategies to enact these values: (1) designing situations or encounters in which others can experience high personal causation, (2) sharing joint control over tasks with others, (3) seeing efforts to protect oneself as a joint enterprise and with a growth orientation, and

(4) bilateral protection of others (Argyris, 1982; 1990). These values produce minimally defensive norms, interpersonal relations, and group dynamics, which in turn promote high freedom of choice, internal commitment, and more risk-taking in the Model II behavioral world. Rather than seeking to control others, Model II-oriented individuals couple “articulateness and advocacy with an invitation to others to confront one’s views, even to alter them, in order to produce action which is based on the most complete, valid information possible and to which people can become internally committed” (p. 103). Argyris further described that within Model II behavioral worlds, individuals collaborate to form “decision-making networks” that afford all group members equal opportunity to contribute from their perspectives. Individuals with this orientation do not seek to compete with or outdo others in their environment, and thus are less interested in gratifying their own needs at the expense of others.

A critical mechanism used to maintain Model II values is the frequent public testing of theories. Individuals use what are called “disconfirmable processes” to test their attributions and evaluations, and are challenged to justify those assessments with evidence of the directly observable data that informed their development. These processes normalize a sense of responsibility amongst individuals in Model II behavioral worlds such that when presenting their ideas, they will do so with reference to directly observable data available to all actors in the environment, as well as the expectation that others will provide constructive feedback on those ideas. These conditions promote what action scientists call double-loop learning, a process through which “errors are corrected by changing the governing values and then the actions [associated with them]” (Argyris, 2002, p. 206; Argyris and Schön, 1978). Argyris (1990) explained that successful double-loop learning within organizations necessitates attention to how individuals learn at every level of a system:

Double-loop learning for individuals and social systems must necessarily be studied together . . . Individual theories-in-use are based on the social system and culture in which individuals are embedded. However, double-loop learning . . . cannot be achieved without first changing individual theories-in-use. In short, although individuals and social systems are identifiable as separate entities, double-loop learning cannot occur without both of them being taken into account. (p. 474)

Double-loop learning requires that individuals and organizations engage in critical reflection on how their espoused theories differ from their

theories-in-use, and work to change the cultural assumptions, norms, and values that cause recurring misjudgments and other mistakes (Argyris, 1982; 1985; 2002; Argyris and Schön, 1996). Thus, this learning orientation enables individuals and organizations to identify and challenge “defensive routines” – or the “thoughts and actions [that are] used to protect individuals’, groups’, and organizations’ usual ways of dealing with reality” (Argyris, 1982, p. 5) – which restrict learning across the individual, group, intergroup, and organizational levels of the system (Argyris, 1993; Argyris and Schön, 1997). While single-loop learning involves identifying mistakes without addressing their underlying cause, double-loop learning is future-oriented, and focused on acquiring the knowledge organizations need to respond more effectively to challenges in their organizational and institutional environments (Argyris and Schön, 1978). Model II behavioral worlds are said to promote minimally defensive interpersonal relations and group dynamics, learning-oriented norms, and higher freedom of choice, internal commitment, and propensity for risk-taking amongst individuals in Model II behavioral worlds (Argyris, 1982; Argyris and Schön, 1974).

Model O-I and Model O-II Learning Systems

As alluded to in what I have described so far of the concept of behavioral worlds, there is an interdependent relationship between the theories-in-use held by the individuals within an organization and the organization’s learning system. Argyris (1996) elaborated:

Individual theories-in-use help to create and maintain the organization’s learning system; this system, in turn, contributes to the reinforcement or restructuring of individual theories-in-use. For example, when individuals operate in terms of “mystery and mastery,” keeping their intentions and strategies private while they seek to master their interactions with others, they tend to engender distrust, which may then be widely perceived as a consistent feature of the organization’s behavioral world. And a behavioral world characterized by distrust tends to reinforce the disposition of individuals to act according to theories-in-use that feature win/lose behavior and unilateral self-protection. (p. 29)

Though Argyris is discussing central characteristics of a Model O-I (the “O” is for “organizational”) learning system in this excerpt, he clarified that both Model I and Model II theories-in-use “will create systems with identifiable features that form a self-maintaining pattern” (Argyris, 1982, p. 89). Though features of Model O-I and Model O-II learning systems are discussed at length in Chapter 13 (see Figures 13.1 and 13.2), here

I discuss them briefly in terms of the implications their behavioral worlds have for organizational learning to underscore an important point in the action science literature: single- and double-loop learning are not mutually exclusive, and in fact often do occur at the same time within organizations.

Model O-I (or limited) learning systems promote single-loop learning because individuals are engaging in unilateral self-protection to avoid experiencing personal vulnerability or making the organization vulnerable to threats from its external environment. Argyris (1982) argued that one of the primary ways individuals work to avoid feeling vulnerable is by labeling errors as “uncorrectable whenever their correction entails double-loop learning – that is, when norms central to organizational theory-in-use would have to be questioned and changed” (p. 92). Individuals deny and conceal uncorrectable errors through processes called camouflage and protection (also discussed at length in Chapter 13), and use self-sealing processes to prevent exposure to information they might otherwise later be held responsible for knowing as a backup method should their efforts at camouflage fail (Argyris, 1992). They are unable to inquire of or challenge the organizational features which perpetuate uncorrectable errors, because conditions in their behavioral world prohibit what is called “deuterolearning,” or “learning how to learn” (Bateson, 2000). Argyris (1996) argued that “a shift from O-I to O-II learning systems [is] critically dependent on individual deuterolearning, which [is] a shift from Model I to Model II theories-in-use” (p. 29).

Model O-II learning systems make room for both single- and double-loop learning to occur, and each type of learning has a respective role to play in maintaining system processes. Argyris (1982) explained:

The first kind that would be encouraged is single-loop learning. This is relatively straightforward learning because the errors are usually attributable to defective strategies or actions . . . inventions are produced to correct the error in strategy or assumption . . . Evaluation then follows: If the response corrects the error, learning is terminated; if the response is a mismatch, the actor returns to diagnosing the error. (p. 104)

This learning orientation is supported by conditions in the Model II behavioral world described earlier: minimally defensive group dynamics and interpersonal relations, and “inquiry-oriented, high-trust, and high-risk taking dynamics” (p. 106). Individuals in Model O-II learning systems believe it possible to change both themselves and their organizations while remaining stable enough to prevent organizational vulnerability. Argyris noted that O-II learning systems are always changing because pursuing

solutions is “an open-ended process in which cycles of organizational learning create new conditions for error, to which members of the organization respond by transforming them so as to set in motion the next phase of inquiry” (p. 106). Thus, O-II learning systems promote double-loop learning as an ongoing and iterative processes which takes place over time rather than as an end state goal.

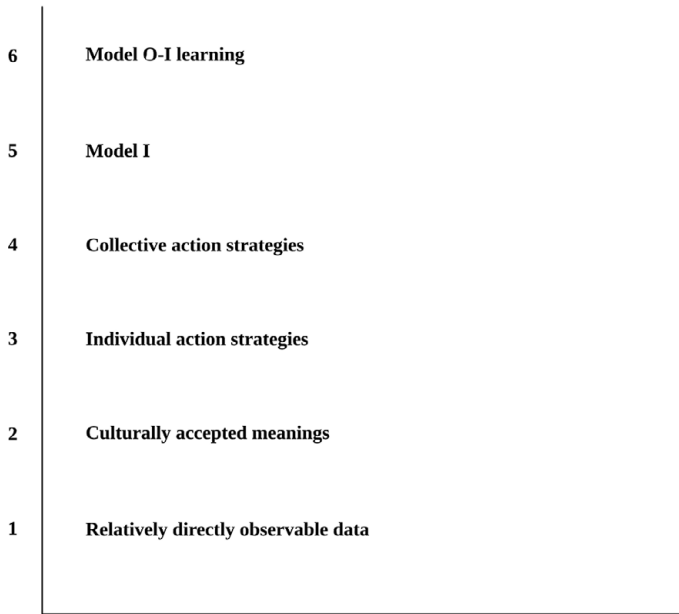
Trends in the Extant Educational Research on Single- and Double-Loop Learning

Though the concept of single-loop learning has rarely been identified by name in the educational literature, its relevance is evident where researchers have explored the possibility that the concept is at the root of several intractable challenges across K-16 contexts, including: developing effective leadership and organizational management strategies in colleges and universities, optimizing professional learning experiences for preservice K-12 teachers, in-service teachers, and educational administrators, reconciling the theory-practice gap, surfacing challenges related to educators’ deficit perspectives, school improvement, reform and restructuring, instructional coaching, and integrating critical reflection into the hard sciences (Ainscow et al., 2013; Bensimon and Malcom, 2023; Bizami et al., 2023; Brown and Cherkowski, 2011; Connolly et al., 2018; Dowd and Bensimon, 2014; Downey, 2008; Duffy, 1996; Finnigan and Daly, 2012; Glazer et al., 2023; Goertz et al., 2009; Hanson, 2001; Kaplan and Owings, 2013; LeMahieu et al., 2017; Leonard, 2002; Lindahl, 2010; Marzano et al., 2001; McClellan and Dominguez, 2006; McLaughlin and Talbert, 2006; Park et al., 2013; Peurach et al., 2018; Rohanna, 2022; Schiera, 2021; Tagg, 2003; 2010; Turns et al., 2014; Wise and Cavazos, 2017; Woulfin and Spitzer, 2023). In recent decades, interest in double-loop learning has increased considerably in educational research as seen across several sub-topics in the literature, notably in: action research (Boyce, 2003; Bragg and Durham, 2012; Donohoo, 2013; Gibbs and Wood, 2023; Lunenburg and Ornstein, 2021; Mertler, 2019; Militello et al., 2009; Stringer and Aragón, 2020; Zepeda and Ponticell, 2018; Zuber-Skenitt, 1993), continuous improvement (Anderson et al., 2023; Collinson and Cook, 2006; Evans et al., 2012; Hora and Smolarek, 2018; Ingram et al., 2004; Kruse, 2001; Tagg, 2007), school management and school effectiveness (Verhelst et al., 2023), teacher professional learning communities (Robbins and Hoggan, 2019; Van Lare and Brazer, 2013), and teacher inquiry (Hauge, 2021; Stoll and Kools, 2017).

Despite this growing interest, little reflection has taken place on the preconditions for developing double-loop learning that are outlined in the organizational literature in which the concept was originally developed. There are also two critical differences between how education and organizational scholars conceptualize double-loop learning that have important implications for how current recommendations in the education literature might be better translated from theory to use by educators in practice. The second is an extension of the first: education researchers have largely thought about double-loop learning as an end goal rather than the ongoing, iterative process it is described as in the organizational literature. As a result, many recommendations for double-loop learning-related processes in the education literature are missing a clear explanation of which factors impact an individual or organization's ability to maintain consistent commitment to ongoing critical self-reflection past the point of implementing a short-term intervention. The second difference is that single- and double-loop learning are modeled as part of O-I and O-II learning systems using a framework called the ladder of inference, which places a deliberate focus on how individuals' cultural understandings influence their perceptions and processing of directly observable data in the organizational environment. Without considering this framework, education researchers are missing the cultural dimensions of teacher thinking and cognition that impact their individual and collective actions, as well as their propensities for engaging in single- and double-loop learning respectively. Next, I review this framework's dimensions and discuss how it provides structure to the systematic literature review featured across Chapters 2 through 7.

Repurposing the Ladder of Inference Framework to Investigate K-12 Teachers' Inferential Thinking about Culture in Urban Schools

Argyris modeled the process of inferential thinking that leads an individual from observing data in their environment to acting on and learning in response to that data using a framework called the ladder of inference. Figure 1.1 models this relatively abstract process as one in which the "evaluations or judgements [that] people make automatically are not concrete or obvious [but] abstract and highly inferential" (Argyris, 1993, p. 89). A central assumption built into this framework is that individuals make sense of and attribute meaning to directly observable data in the organizational environment – and the external environment surrounding



Note: Figure 5. *Ladder of Inference*. Reproduced from *Reasoning, Learning, Action* (p. 181), by C. Argyris, 1982, Jossey-Bass Publishers. Copyright 1982 by John Wiley and Sons. Reproduced with permission.

Figure 1.1 Ladder of inference.

Note: Reproduced from Argyris, 1982. Copyright 1982 by John Wiley and Sons. Reproduced with permission.

their organization – with cultural understandings acquired through their personal and professional experiences, as well as through their exposure to mainstream cultural norms and societal values. While many variations of this framework have appeared across disciplines in academic research, here I am referencing a classic version featured in Argyris's seminal text *Reasoning, Learning, and Action* (1982). This model of the ladder of inference – which represents an individual utilizing a Model I theory-in-use – begins with individuals observing relatively directly observable data in their organizational environments (Rung One), to which they then quickly assign culturally accepted meanings (Rung Two).

By Rung Three individuals take action based on the meanings they assign to the data on Rung Two, and they continue working to understand that data across higher levels of the ladder of inference as they respond to it using both individual and collective actions on Rungs Three and Four.

Argyris theorized that by Rung Three most people are not consciously aware of the theories of action they rely on to justify their thinking beyond this point. Rungs Five and Six represent Model I learning at the individual and organizational levels respectively, with the latter rung taking into account consequences for an organization's behavioral world and learning associated with a Model I theory-in-use. Thus, the ladder of inference helps consulting practitioners understand how people within organizations make inferences about the effectiveness of their own and others' actions, as well as the extent to which they believe they have achieved their own intentions in a given situation (Argyris, 1982).

Peter Senge – the systems-thinking scholar whose work spearheaded the use of action science and the ladder-of-inference framework in schools – described three ways the ladder of inference has been used as a tool for examining implicit assumptions and beliefs in schools: (1) to learn to become more aware of one's own thinking and reasoning, (2) to make one's thinking and reasoning more visible to others, and (3) and to learn more about others' thinking and reasoning processes (Senge, 2014, p. 245). Perhaps the most influential research on the ladder of inference in schools appears in the literature on schools as learning organizations, as an evaluative tool for understanding students' inferential thinking processes in the classroom (Senge, 2006; Senge et al., 2012). It has also been imagined as an instrument for fostering trust and promoting collaboration amongst teacher colleagues (Cardno, 2012; Glaser, 2004; Kohm and Nance, 2007; Robinson and Lai, 2005), as a developmental tool for school consultants (Newman and Rosenfield, 2018; Reigeluth and Karnopp, 2013; Wizda, 2004), and more generally as a euphemism for pushing an individual or organization to move beyond "leaps of abstraction" and to look more closely at both the data and assumptions underlying their observations (Aguilar, 2013; Senge et al., 2012). To the author's knowledge, it has not been used to examine teachers' inferential thinking about their students in any setting, much less in school contexts that serve large populations of students from low-income and other minoritized cultural communities.

Across Chapters 2 through 7, I repurpose the ladder of inference as an organizing framework to develop a systematic review of the educational literature on teacher thinking in K-12 urban schools. The purpose of this inquiry was to understand the extent to which social, organizational, and psychological factors identified in the extant literature on urban teacher thinking provide evidence that organizational conditions in urban schools increase or decrease teacher effectiveness at learning about and from their students' cultures at work from an action science perspective. To simplify

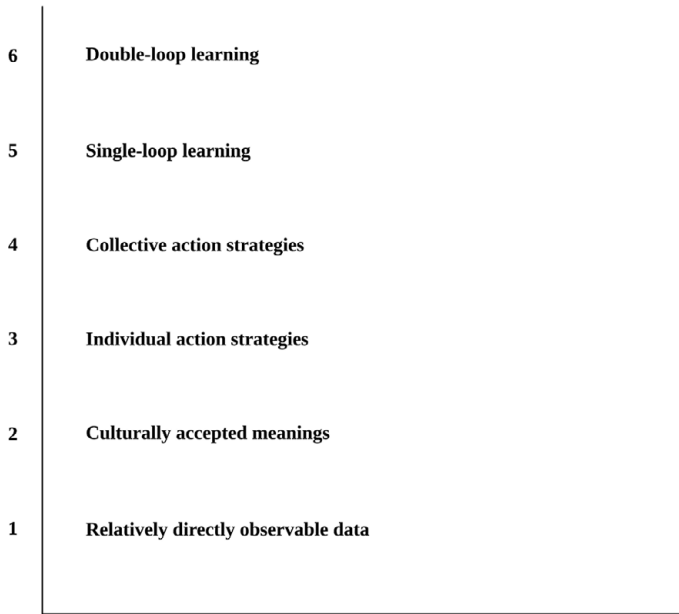


Figure 1.2 Ladder of inference for O-II learning systems in urban schools.

the organization of this systematic literature review, Figure 1.2 features a version of the ladder of inference I imagine might exist among individuals who share a Model O-II learning system in K-12 urban schools (and other schools serving high proportions of students from LIMCCs). In this version, single-loop learning occurs on Rung Five both as a precursor and concurrent to the double-loop learning which occurs on Rung Six. This reimagining mirrors the structure of the figure Argyris used for Model O-II learning systems in which single- and double-loop learning are modeled as two types of learning that can occur within the same system at the same time. I sought to identify evidence of factors contributing to both single- and double-loop learning amongst K-12 urban teachers, and to explore my working hypothesis that it is single-loop learning that keeps these teachers from effectively enacting their commitments to enacting cultural responsiveness in practice. Throughout the review, I develop an argument for how persistent challenges to teachers' double-loop learning in urban schools might be addressed at their roots, by examining variance in how teachers make cultural meaning of directly observable data about the students, families, and communities with whom they work.

Introduction to the Literature Review

Literature Search

To identify research on K-12 urban teaching for inclusion in this review, I began by referencing the Top 100 Education Journal lists from the 2022 and 2023 Schimago Journal and Country Rank listings to set boundaries for the extensive searches I would conduct using Google Scholar as a primary source database. Google Scholar enabled me to search across several relevant academic databases at once, including: APA PsycArticles, Educational Resources Information Center, ProQuest Social Sciences, ProQuest Sociology, and Sociological Abstracts. Initial keyword searches were conducted using general terms related to teacher thinking in urban schools, including combinations of descriptors for (a) teacher cognition (e.g., *inferential thinking*, *teacher thinking*, *urban teacher thinking*) and (b) schools serving students from LIMCCs (e.g., *low-income schools*, *urban schools*, *urban teaching*). I used keywords including the term “urban” to reflect the fact that students from LIMCCs are more likely to be sorted into the most underserved schools in urban communities, and to make a clear choice not to label people in these communities as “urban.” Multiple terms denoting characteristics of rungs on the ladder of inference were combined with terms for teacher cognition and schools serving students from LIMCCs (e.g., *directly observable data*, *cultural meanings*, *culturally accepted meanings*, *individual action*, *collective action*, *teacher mistakes*, *teacher learning*). I used these descriptors to search across all academic databases included in Google Scholar’s search engine, reviewed the first fifty pages of results for each search, and refined the thousands of results generated by these broad searches by keeping for consideration only those published in academic journals that had appeared across the Top 100 Education journals Schimago lists between 2022 and 2023. The resulting list contained 1,138 journal articles, and I supplemented these articles with others that had either cited or been cited by them as well as some seminal pieces from the organizational literature to better situate the discussion in context.

Inclusion Criteria

I focused on studies published about school contexts in the United States in the period between 1970 and the present, because this timeframe represents an approximate period during which education researchers

began focusing more intentionally on the schooling needs of students from LIMCCs and during which they could access Argyris's literature on action science and the ladder of inference. I also sought out studies in which teachers were the sole subjects of the research, and in which teacher thinking in urban schools was discussed relative to: (1) their assessments of or relationships to their students, (2) their instructional choices and classroom management strategies, and (3) their perceptions and assessments of the organizational conditions in their workplace environments. Using the action science literature, I developed selection criteria for the 374 articles included in this review using a codebook based on information available at each level of the ladder of inference framework (Appendix A, Table 1.3). I conducted three readings of each article, across which I sought to: (1) use the keyword searches to get an overview of terms and concepts related to teacher thinking in K-12 urban schools, (2) make comparisons across conceptualizations of terms used in the action-science and organizational literatures with concepts featured in research on teacher thinking in urban schools, and (3) synthesize whichever dimensions of teacher thinking in urban schools had already been identified in the educational literature from an organizational perspective. Ultimately, this review contributes a reimagining of the ladder of inference framework as a normative model for how urban teachers experience cultural learning as a process of using evidence and reasoning to design and implement their intentions through their actions. I imagine the ladder of inference laid horizontally in the space between what teachers know and what they are able to do in practice as featured in Figure I.1, as a tool for exploring how ineffective cultural learning processes contribute to the maintenance of this gap in urban schools.