One approach to action research developed by Chris Argyris at Harvard with Donald Schön of MIT starts from a theory of human action. It posits that individuals act on the basis of their beliefs, and that the beliefs that drive action are largely unexamined and tacit. In this chapter, we discuss this cognitive approach to improving action by studying and changing human reasoning. We illustrate the use of this approach in higher education by describing the use of action science in a graduate program in adult education and human resource development. We then present examples of transformations made possible by the use of this action technology and analyze the outcomes at the individual, team, faculty, and program level.

The Theory of Action Science

Action science is a theoretical orientation that goes beyond a description of the process of critical reflection to offer a theory of intervention. It is intended to increase awareness of the puzzles and contradictions hidden in everyday interactions and to create the conditions for social change (Rogers, 1989). Action science begins with a view of human beings as designers of their actions in the service of achieving intended consequences. They make sense of their surroundings by constructing meanings, both cultural and individual, of their environment. These constructed meanings, in turn, guide actions (Argyris, 1982; Argyris, Putnam, and Smith, 1985). In action science, behavior is evaluated for consistency and validity against those internalized beliefs and meaning systems that individuals hold.

These meaning systems are the product of a rapid reasoning process, which itself may be flawed. Human reasoning is an artful, automatic process involving an escalation from the selective noting of observable events to abstracting about those events. Argyris uses a “ladder of inference” to make this reasoning explicit. The first rung of the ladder of inference is the directly observable behavior we select to which we pay attention; the second rung is the meanings we assign to this behav-
ior; and the third is the action theory we derive from the lower rung interpretations.

Using the ladder of inference and sharing the process of creating meaning allows individuals to transform their behavior by understanding their often unexamined, rapid reasoning. For example, an instructor is asked if an assignment is mandatory or voluntary and replies, “I haven't lost my patience yet.” What the instructor says is rung one on the ladder. Students might conclude that the instructor really means that the assignment is mandatory (rung two). They may construct personal theories regarding how to act thus: If the instructor answers a direct question with an ambiguous response, then she is getting angry and I had better do the assignment (rung three). This rapid movement through the ladder of inference from directly observable data to a personal action theory enables an individual to take quick and decisive action. Of course, the instructor may have meant something entirely different such as “I really haven't made up my mind. Things are going well as they are.” This is where error often occurs. The work of action science is in making this reasoning visible so that it can be examined and ultimately changed.

Designing action requires that individuals develop a set of personal causal theories to describe and predict their world. These causal theories, termed “theories of action,” include two types—espoused theories (those which individuals claim to follow) and theories-in-use (those which can be inferred from their actions). Thus, people actually hold two sets of theories: one about what they say they do and one about what they actually do. The espoused theory and theory-in-use may not be consistent, and an individual mayor may not be aware of the inconsistency. While the espoused theory is conscious, the theory-in-use is most often tacit. A goal, then, of action scientists is to discover theories-in-use, particularly ones which inhibit or promote learning. The general model of action science is depicted as follows.

Values and Beliefs lead to → Action Strategies, which have → Consequences

Values and beliefs are those internalized values held by individuals and by cultures. Action strategies are the actions we take in order to enact values, and they have consequences for learning. When consequences are unintended, there may be a mismatch between action strategies and governing values. Action science describes two types of responses to mismatches. The first response is single-loop learning (also called Model I) in which action strategies are adjusted or changed (similar to trial and error learning). Single-loop learning is associated with a win/lose orientation, short-term gains, and a desire to control. The second response to a mismatch is double-loop learning (also called Model II), which involves the examination of values, not merely the adjustment or behavior. Incorporating critical reflection upon values and beliefs, double-loop learning is associated with having free and informed choice, valid information, and high internal commitment to new behavior.

Data Collection and Analysis in Action Science. Action science uses talk, a basic and important form of social action, as the raw data. Talk is the primary window into people's actions, values, and beliefs. This action technology begins with a sample dialogue—either an actual transcript, audio or video tape, or written reflection on what was actually said or done in a case. The case illustrates a problem the individual is having interacting with others or an anticipated dialogue that individuals believe may be difficult. Figure 4.1 depicts an action science case presented
by “Larry” during the action science course described later in this chapter. Individual members of the group code the case to identify underlying themes and assumptions embedded in the dialogue. This coding makes the evaluations and judgments by the members of the group explicit. Larry’s case is coded in Figure 4.1.

**Group Data Analysis.** Cases such as this one are discussed in groups. Group analysis of the data collected is the most powerful aspect of action science. Groups are made up of individuals, each of whom brings in a separate case. The group works to surface tacit beliefs held by the case writer that influence the outcome of the dialogue. This leads to exploration by the group of alternative strategies. For example: What does Larry believe that gets him into trouble? What else could Larry do in this case? Uncovering the tacit theories-in-use, discovering the gaps between espoused theories and theories-in-use, and examining the relationships among governing values, action strategies, and consequences is where most of the learning occurs for the individual case writer as well as for the group.

In the course of data analysis, thoughts and feelings of all participants are identified as they analyze the case. Attributions made by participants in the case as well as by group members are identified in the process of working through the case. The process is slowed down and individuals' here-and-now experience is shared. Inferential leaps that participants make when drawing conclusions from the data of the case are flagged, using the ladder of inference. Groups work from the directly observable data (dialogue) to agreed cultural meanings to identify the themes of the case. The process involves collaborative critical reflection and group members challenge the tacit assumptions of both the case writer and of other group members. The effect of this approach is that the case also becomes a vehicle for a “group case” in which all group members have an opportunity to get feedback on their ability to give feedback and on their reasoning while also experimenting with new behavior.

**Data Mapping.** Mapping is a vital instrument in action science, allowing learners to go beyond the details of a particular case to represent more generalizable patterns of behavior and belief systems. Maps are systematic depictions of governing values, action strategies, and consequences in a given case. In the course of the process of mapping, maps are considered incomplete until group participants offer confirming and/or disconfirming evidence. This evidence addresses the question of validity in the action science process. Both “here-and-now data” (descriptive maps derived from on-line interactions) and ideal depictions (normative maps derived from action science theory) may be included in maps. Maps are often “layered” or “nested.” For example, at one level an individual trainer may map her behavior with regard to a persistent problem at work. At another level, there is a larger map of the organizational and cultural dynamics influencing her behavior. Figure 4.2 depicts Larry's map of his case.

Maps enable individuals to determine the ways in which their thinking about a situation leads them to act ineffectively. This map also depicts the way in which system problems interact with individual issues.
Figure 4.1. Coding of Larry's Case

Note: The italicized text indicates codes and notations an action scientist might make about the underlined words and phrases considered significant in Larry's case.

**Situation:** I'm a 26 year-old intern at a manufacturing firm. I work in a small division, and organizationally I'm above a secretary and below a director. My boss, D, a director, has given me a great deal of authority. In fact, I can prioritize and assign work to the secretaries as I see fit.

What leads L to define this “great deal” of authority? What is significant to L about being given this authority?

One secretary, S, is 47 years old and has been with the firm for years. I would frame her as a “plateaued” worker. One day, she took the afternoon off without telling me or my boss (who was out of town).

What did S say or do that led you to attribute that she is a “plateaued” worker?

My boss instructed me to speak to S and to use my judgment in “disciplining” her. My boss also told me to document everything. I was really worked up about what to say and how to say it. What follows is the conversation we had the next day.

This seems to be a dilemma. On the one hand, the boss tells L to “use his best judgment” while on the other, he tells L to “discipline” S. Does L see a dilemma?

**Dialogue**

<table>
<thead>
<tr>
<th>What Was Thought or Felt But Not Said</th>
<th>What Was Actually Said</th>
</tr>
</thead>
<tbody>
<tr>
<td>I hope this goes well. I hate confrontations</td>
<td>L: Good morning, S.</td>
</tr>
<tr>
<td>What leads L to frame this as a confrontation?</td>
<td></td>
</tr>
<tr>
<td>I hope S does not get mad. I hope I handle it well. Ugh!</td>
<td>S: Good morning, L</td>
</tr>
<tr>
<td>What would “handling it well” look like?</td>
<td></td>
</tr>
<tr>
<td>I was furious! You left me in the lurch! I could have killed you. I felt like a fool I didn’t know where my secretary was; I had to type something!</td>
<td>L: I want to talk to you yesterday, you left without telling me or D, and I really needed you. It really hurt my feelings. It made me feel like you don’t care about me or respect me.</td>
</tr>
<tr>
<td>Arbitration/evaluation</td>
<td></td>
</tr>
<tr>
<td>Oh sure! How much could see something you never wrote! You liar!</td>
<td>S: I’m sorry, I thought you knew. I passed Around a note saying I would be gone. I guess you didn’t see it. I’ll have to make sure you see it next time. (pause) Anything else?</td>
</tr>
</tbody>
</table>
Arbitration/evaluation/judgment

That's it? No groveling?

What leads L to think that S should grovel?

Wimp! I can't believe I didn't say how I felt! L: No, I just wanted to tell you how I felt. Some interventionist I am!

What would a “real interventionist” have done?

Comments and reflections: As it turned out, S had written a note that my boss, D, later found upon his return. Since the intervention, S and I have a very superficial relationship. Also, I was asked to recommend S for a raise I did not now, I would like to explore these issues

1. What prevented me from expressing my left-hand column?

What leads L to believe that he should express these thoughts?

2. Why do I feel like a rat?

What is rat-like in L's behavior?

3. What could I do better next time?

This is where learning in action science begins.

Teaching Action Science

At the University of Texas, action science is a theoretical framework for the graduate program in adult education and human resource development. A course was developed based on a similar one taught by Chris Argyris and Robert Putnam at Harvard University. The course is structured with an initial one- or two-day workshop to define key terms and to give students an initial “safe” laboratory experience. They look at cases of problematic interpersonal situations and analyze video and print cases. Initial practice includes learning to identify assumptions and attributions (their own and those reflected in the presented cases). They code a case (see Figure 4.1). Then they experience a fishbowl activity in which volunteers from the class join a group of trained action scientists in working a case by coming from the outer circle to an empty chair, making an intervention, and then moving back to the outer circle. These brief attempts at working with a case are used as a laboratory to test various approaches to giving and receiving feedback. Role playing with a reluctant “learner/case writer” helps dramatize the difficulty in giving feedback without creating defensiveness.
From these workshop learning activities, we move into group sessions in which students work on each group member's case. Groups consist of four to six students and one or two action science facilitators (students who themselves have at least one semester of study of action science). Facilitators commit to an additional action science session with the course instructor to work each week on any problems they experience in their facilitation of the groups. The course is designed to incorporate practice in writing and analyzing cases. The cases allow students to experience difficult discussions about real events of high personal significance. Individuals are encouraged to accumulate cases around a common dilemma and to practice addressing the dilemma in real interpersonal situations. The interpersonal nature of this theory and its implementation in student groups necessitates first creating a climate of trust that includes critique. This climate enables students to come lo the process prepared to question the validity and utility of the feedback given in these groups. Student facilitators function not as “experts” but as co-learners.

After the first workshop, the format of the remaining half-day sessions of the course is a combination of lecture and group work followed by community meetings of the entire class. In each of the remaining sessions, the entire class explores one concept of action science in depth prior to group meetings. Groups are encouraged to apply the concept in their analysis and to work with individual cases. Then, all of the groups come back together to discuss common issues or to prepare for the next class session.

In the small groups, case work follows Argyris’ problem-solving model in which we diagnose a problem, invent action strategies to solve the problem, produce action to enact the
strategies, and evaluate the results. Diagnosing the problem in the case means that individuals clarify the multiple meanings inherent in a given case (what the writer intended to convey and possible alternative interpretations). When the group exhausts this phase of the process, they develop a statement called a theory-in-use proposition, which encapsulates the dilemmas in the case. These propositions are if-then statements which specify the issue facing the individual, the actions the individual typically takes under these conditions, and the consequences of taking what are generally unproductive actions. We use a formula: “When ___________ happens, I am afraid that ___________ will happen, so I _______________ which guarantees that ___________ will happen.”

The group subsequently works to invent an alternative approach that follows Argyris' theory of Model II action. In other words, they attempt to invent an approach the individual could take to promote learning and to reduce defensiveness in the case situation. This is equivalent to the action strategy phase. Argyris' theory stresses that there are many gaps between these inventions or intentions and actions.

Next, the group asks the individual who wrote the case to produce the alternative. This is the hardest part because the individual who brought the case is generally stuck in a particular mode of reacting, and it is extremely difficult to sincerely alter his or her style. Often, groups try again and again to suggest dialogue that they believe transforms the case. Sometimes each group member writes what he or she would say. The case writer then tries to say the words suggested by each group member until the case writer finds words with which he or she feels comfortable that also truly alter the control dynamic in the case.

Assignments consist of a composite portfolio or journal of the individual’s reflections and a research paper. The reflections include the cases written, possibly a portion of the transcript of the group’s discussion of the case, a description of the theory-in-use propositions given, and the various attempts at redesigning the case. The reflections summarize what the individual learned about his or her interpersonal skills and observations about the action science process.

The research paper asks individuals to select one of the key action science concepts such as defensive routines, the ladder of inference, Mode I/II, and to read everything that Argyris wrote about it. This is reported and synthesized in the paper. Other options for the research paper include reading various critiques of action science, comparing action science to related group or action research strategies, or studying issues in action science such as that of competency acquisition vs. therapy.

**Issues in Teaching Action Science**

In our experience teaching action science, three critical issues continually reappear with each new group of learners: the seemingly therapeutic nature of action science; the problem of whether students experience free and informed choice; and the competence of those practicing action sciences. We discuss each issue individually.

**The Therapeutic Nature of Action Science.** Students often state that being in an action science group feels like “therapy.” Argyris’ view is that action science is not therapy, but skill learning (1968). However, when students are examining each others' reasoning and exploring the unexpressed feelings in situations they found interpersonally difficult, it is reasonable to expect that some therapeutic issues will be touched upon. We caution students that when the group feels like therapy, they need to make this known in the group.
and to set appropriate limits. We attempt to make this issue discussible so that novice learners will speak up when they feel threatened. Yet setting appropriate limits is difficult to do in the group. Argyris suggests that facilitators make minute-by-minute judgment calls in group settings when people are trying to learn new skills that are both experiential and interpersonal. It takes considerable skill both on the part of facilitators and the new learners to make appropriate calls when therapeutic issues come up, yet learning to do this is a necessary part of learning action science.

**How Do We Ensure That Students Have Free and Informed Choice?** Students often protest that participating in action science is both voluntary and mandatory. They remind faculty that one of Argyris' Model II values is “free and informed choice” and point out that some parts of the course are required, while others are voluntary or “free choice.” In addition, although the course is not required, the placement of the course in a weekend program in which students took all courses in lock-step fashion makes it de facto a required course. We agree that this is a dilemma. It is also difficult to make collaborative decisions about course content, activities, and assignments when we do not share a common base of information. We concluded that enrollment and some types of participation are essentially free choice; yet students were correct that much of the course is mandatory. Related to the concerns about whether students enjoyed the freedom inherent in Argyris' theory was the issue of how to prepare students to make an informed decision regarding whether to participate when they had no way to know what this experience would be like, in other words, to ensure informed consent. In an experiential learning situation, the learning is in the experience and it is very difficult to tell someone what to expect. They literally have to have the experience before they can decide whether or not to continue.

We find this dilemma even more difficult to solve satisfactorily.

**Facilitator Competence.** A legitimate concern of individuals participating in an experiential learning activity is whether or not those who guide them know what they are doing. In an area as difficult as interpersonal skills learning, this is particularly important. While we had studied action science and practiced it for over six years, we were also aware that this did not mean that we would always act competently. The theory of action science suggests that people make errors when threatened and that they are often unaware of their errors. We strive to create a climate in which everyone's competence is evolving and no one is necessarily perfect. We hope that all of us are a part of a learning lab, and that students will help each other, their facilitators, and instructors become aware of any gaps in their practice. One way we create this climate is for both the instructor and the facilitators to write cases and to share them with the class and with their groups when things come up. For example, the instructor once shared the case presented in Figure 4.3. When the instructor presented this case, both the students and the instructor were able to openly acknowledge the difficulty of teaching this material. Students appreciate having the work modeled and are more comfortable learning in an atmosphere in which the instructor is open to critique. This event also creates more of a culture of intimacy, which makes it easier to take risks.

**Transformation in Action Science**

Action science provides a means for change at the individual, team or group, instructor, and program or organization levels. It can be both powerful and unpopular because of its transformative nature. While transformations creat-
ing new perspectives may be desirable, this process is often difficult and painful.

At the individual level, action science case writers gain insight about what they do to create situations they do not want. As illustrated by Larry's case (Figure 4.1) and Larry's maps (Figure 4.2), Larry learned more about himself. Through this process, Larry has the potential to become more direct, more skilled in interpersonal situations, and more aware of errors in his reasoning about power and authority.

At the team or group level, action science can help teams and groups transform themselves. Action science can be used to transform the way in which a group learns together. Some facilitators share cases with their groups. Two facilitators, Ann and Sue, developed a map for one of their interventions in an action science group and shared the map with the group. Members of the group agreed that they observed the behaviors embedded in the map. Discussion of such maps develops a greater sense of trust and respect for the facilitators who are willing to be open about their unsuccessful facilitation. Further, the facilitators asked the group members to alert them when they were enacting the ineffective behaviors in the map. This creates a sense of release for members of the group who can now acknowledge openly that some of what the facilitators do seems “incompetent.” Before sharing the map, the facilitators and group members were dealing with their power, control, and competence issues in ways that inhibited learning. After discussing and reflecting on their map, the facilitators and the group members were able to become more of a collaborative learning community. At the instructor level, action science transformed the relationship between teacher and students from one of provider of learning to one in which all were mutually responsible for their own and each others’ learning. Finally, at the organizational level, action science can facilitate transformation. In the program at the University of Texas, action science enables students and faculty to have many conversations that may not have been possible otherwise. Issues that were previously undiscussible now have both an ideology and a forum for expression. Specifically, on one occasion, students and program faculty met with Bob Putnam of Harvard University to discuss issues in the program and developed a map of problems perceived by students. This map is illustrated in Figure 4.4.

Following the presentation and discussion of the program maps, the faculty and students began to change the program culture to one of greater directness and mutual accountability for problem solving. At the higher level of students’ ability to effectively discuss difficult issues with authority figures, the learning capacity of all increased. Conversations about what faculty and the university were responsible for and what students might do to support the program led to greater role clarity and comfort with resource allocation. On the other hand, more resistant system problems were also identified and individuals were able to suspend blaming of each other for problems which none had created and none of the group could single-handedly solve. Action science is one of the few action technologies that have the broad transformative potential outlined here.
**Figure 4.3. Having Model I Feelings While Teaching Model II Skills**

<table>
<thead>
<tr>
<th>Model I: Dialogue</th>
<th>Model I: Instructor's Thoughts and Feelings</th>
<th>Model II: What Instructor Wishes She Had Said</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student:</strong> You've set us up to fail. Why don't you just show us how to do it rather than having each of us come up here and make fools of ourselves?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor:</strong> Because I know that unless you try the strategy that you think will work, you will continue to believe that it will, regardless of what we show you here. The key is to look at practice rather than strategy or intervention.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor:</strong> What is it that I said or did that led you to feel that I set you up to fail?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student:</strong> I just knew that no matter what we did, you would not let us win. [Gives data to support this view.]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor:</strong> It feels so competitive, like it's really high risk to fail here.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Win? Wow, this is so competitive!</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Failure is high risk for me, too.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>[If student continues to say &quot;just show us how to do it,&quot; explore further, using dialogue below]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor:</strong> I find myself in the following dilemma: How can we both look at and challenge skills we now take for granted as &quot;working&quot; while learning new skills that we don't yet know well enough for them to work?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Implications of Action Science for Adult Educators

While facilitators have developed many strategies to aid reflection in action science, there is no substitute for strong group process skills. While difficult issues may surface in any of the action technologies described in this book, this one so directly zeroes in on problematic interpersonal situations that it can be highly volatile. It is not unusual for individuals to experience strong emotions and for facilitators to be challenged to think on their feet. Some feel as though they are in therapy groups with this intense focus on their behavior. In short, this is not for everyone. Caution is appropriate.

On the other hand, the tools of action science are not at all mysterious. Anyone can write a case. Analyzing critical incidents of behavior to determine whether or not one is combining advocacy, inquiry, and illustration when under threat is easily accomplished without the need of a group or a specially trained facilitator. Maps of action strategies with suggested alternatives can be developed by collecting cases in writing or through interviews. As a guide to aid individual reflection or as a tool to conduct needs assessments or organizational diagnoses, these tools are highly useful.
Moreover, the theoretical framework which undergirds action science is normative. This framework suggests ideal conditions for dialogue. Action science would be limited if it argued only for a culture change without speaking to the systemic and social norms that produced the current culture. Yet, because it does hope to transform these norms and because it has evolved specific tools and strategies that may produce these changes, it has greater potential than many other action technologies to actually bring about these changes.

Action scientists tend to work within the boundaries of organizational systems. As a result, they generally first change individuals' behavior and that of groups before working to produce lasting fundamental transformations or the organizational culture. Action science has the ability to deal with often difficult yet reoccurring themes or issues such as power, empowerment, and control at the individual, team, leader, and organizational levels as illustrated in the cases presented in this chapter. The promise of producing changes and dealing effectively with difficult issues that are reflected and mirrored by different levels within organizations is the profound appeal of action science.

References


Notes

KAREN E. WATKINS is associate professor of adult education, University of Georgia, and former director of the graduate program in human resource development, University of Texas at Austin.

TOM J. SHINDELL is assistant executive director of the Academy of Human Resource Development.