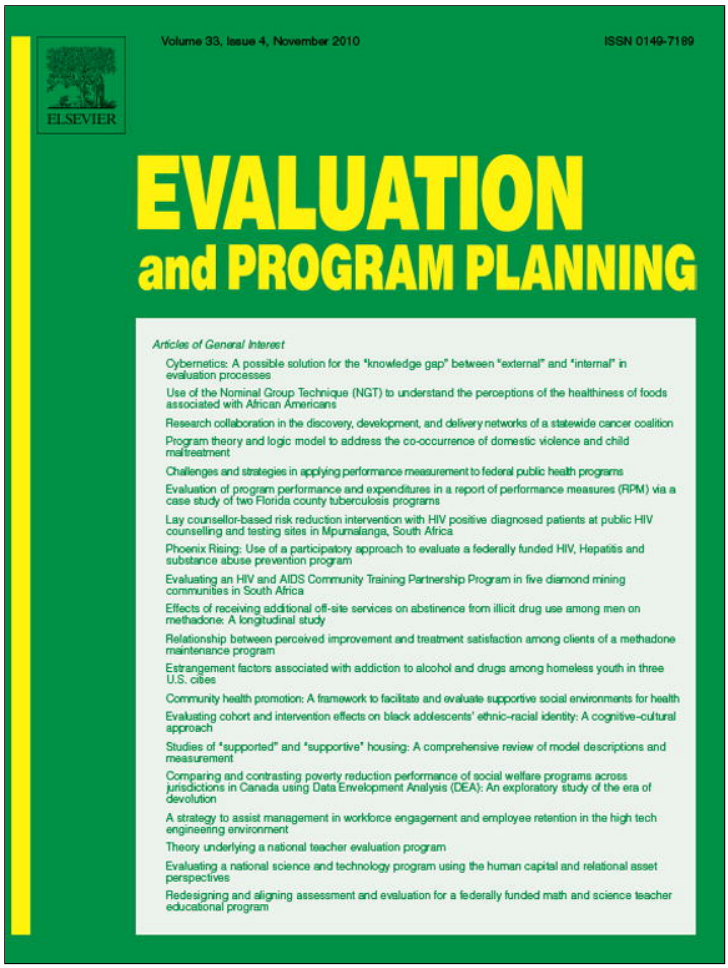

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Cybernetics: A possible solution for the "knowledge gap" between "external" and "internal" in evaluation processes

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ABSTRACT

This paper addresses the issue of the knowledge gap between evaluators and the entity being evaluated: the dilemma of the knowledge of professional evaluators vs. the in-depth knowledge of the evaluated subjects. In order to optimize evaluative outcomes, the author suggests an approach based on ideas borrowed from the science of cybernetics as a method of evaluation—one that enables in-depth perception of the evaluated field without jeopardizing a rigorous study or the evaluator's professionalism. The paper focuses on the main concepts that deal with this dilemma – showing how cybernetics combines the different bodies of knowledge of the different stakeholders, including the professional evaluator, resulting in a coherent body of knowledge created mainly by those internal to the process, owned by them, and relevant to all – those who are internal and those who are external and their different purposes.

1. Introduction

This article offers a possible solution to the issue of the knowledge gap between evaluators and those who are internal to the evaluation process—a gap that, I believe, is a potential threat to the ability of evaluation to fully comprehend the complexity of the object being evaluated.

Knowledge is a vital ingredient in conducting an appropriate/worthy/effective evaluation. It is essential for the person who conducts the evaluation to have knowledge in the field of evaluation; that is, he or she must be an expert in evaluation and have skills in data collection and analysis to begin with, as well as understanding the mechanism of achieving organizational change. This is true even though evaluation as a profession is usually not part of a specific field of knowledge, and evaluators may come from many areas, such as education, health, social work, economics, or psychology. Nevertheless, their main professional knowledge is evaluation.

But knowledge about evaluation is not enough: evaluators have to acquire knowledge about the field that they are required to assess. This, of course, creates a problem because most professional evaluators lack in-depth knowledge of the fields they have to evaluate, and even when the evaluator knows the field, he/she usually does not know the specific evaluand and has to learn it from scratch (Cowin, 1994; Cummings et al., 1988; Demarteau, 2002; Owen, 2003; Sonnichsen, 1987; Terenzini, 1993). This problem becomes even greater when we want to conduct an evaluation in cultures that are different from ours, which, in this era of globalization, has become common.

In many cases, the professional evaluator does not even speak the language of the people being evaluated, not to mention understand the context in which they operate (Barton, 1998; Bercerra, 1997a,b; Fiske, Kitayama, Markus, & Nisbett, 1998; Grudens-Schuck, 2003; Hood, 2004; Levin-Rozalis, 2000b; Levin-Rozalis, Rosenstein, & Cousins, 2009; McDonald, Kutara, Richmond, & Betts, 2004; Mertens, 2007; Schwandt, 2002; SenGupta, Hopson, & Thompson-Robinson, 2004).

The concept of a knowledge gap refers to the discrepancy in the amount of information acquired by different groups of people. It comes from knowledge management and engineering, but we hear it more and more in connection with evaluation (Parkinson, 2009; Perspectives on Impact Evaluation, 2009; Rauschmayer, Omann, Berghöfer, & Zikos, 2008).

While this gap in knowledge is especially noticeable when an external evaluation is being conducted, one would expect it to be considerably diminished with an internal or self-evaluation. However, while the use of internal evaluation partially solves the problem of a lack of internal knowledge, the appointed evaluators often lack knowledge about evaluation and they are always suspected of being biased. Here again, we face a knowledge gap that might jeopardize the effectiveness of the evaluation. An evaluation worthy of its name needs the knowledge of both

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entities: the professional knowledge of evaluators and the knowledge owned by the people being evaluated. But how can this be achieved? How can we reduce this knowledge gap?

Here, I suggest an approach based on the science of cybernetics that can optimize evaluation outcomes. Beginning with a brief review of the main approaches in evaluation that deal with the knowledge gap (focusing on the strengths and limitations of external and internal evaluation), I then present the science of cybernetics as a useful tool for evaluation purposes. And finally, I illustrate the implementation of this approach with two case studies.

1.1. The internal vs. external dilemma

Originally, evaluative services were carried out by professional evaluators coming from the outside—as *external* evaluations. However, the fact that evaluators were personnel external to the evaluated entities and their "everyday life" proved to be a serious limitation. Internal evaluation, however, is believed by many writers to contribute to organizations, or to evaluated entities in general, in ways that are highly important and beneficial to any organization (Bazargan, 2000; Committee for Integration of Internal Evaluation in Schools, 2004; Cummings et al., 1988; Love, 2005, 1991; Rist, 1997; Sonnichsen, 1987; Wandersman, 2003), through such notions as *mainstreaming evaluation*, *culture of evaluation*, *organizational learning*, and *organizational intelligence* (Cowin, 1994; Fincher, 1977; Levin-Rozalis & Rosenstein, 2005; Love, 1991; Preskill & Torres, 1999, 2000; Qureshi, 1998; Sanders, 2002; Terenzini, 1993; Wilensky, 1969). But the reliance on internal evaluation alone has its own problems in regard to credibility, subjectivity, and professionalism. In the words of Scriven (1991: p. 160):

> The trade-offs between external and internal are roughly as follows. The *internal* evaluator knows the program better and so avoids mistakes due to ignorance, knows the people better and hence can talk to them more easily, will be there after the evaluation is finished and hence can facilitate implementation, probably knows the subject matter better, costs less, and is sure to *know of* some other comparable projects for comparison. The *external* evaluator is less likely to be affected by personal or job-benefit considerations, is often better at evaluation, has often *looked closely at* comparable programs, can speak more frankly because there is less risk of job loss or personal attribution/dislike, and carries some cachet from externality and, as Freud observed, cost.

1.2. Changes in evaluation that affect the internal-external issue

While traditionally, authorities were the central stakeholders of evaluations, over the years, there have been changes within the field itself, turning the evaluated objects (whether programs, interventions, organizations) into the fundamental stakeholder. As a result, new models of and approaches to evaluation have been developed, which aim at combining the best of both worlds: internal/self-evaluation and external evaluation. I refer here to the many participatory methods (Barnette & Wallis, 2003; Cousins & Whitmore, 1998; King, 2005), such as action evaluation (Friedman & Rothman, 2001; Rothman & Friedman, 2002), constructivist evaluation (Guba & Lincoln, 1989), empowerment evaluation (Fetterman, 1994; Mertens, 1997), inclusive and transformative evaluation (Mertens, 2001), responsive evaluation (Stake, 1972, 1991, 2006), and the idea that culturally diverse factors are central to "good" evaluation (Madison, 1992; McDonald et al., 2004; Wilcox, 1984), democratic evaluation (Greene, 2000; House & Howe, 2000), multicultural validity (Kirkhart, 1995), and "dialog" between the internal and an external evaluators (Nevo, 2001).

Participatory approaches do not necessarily overcome the knowledge gap, nor do they guarantee the free flow of information between all evaluation participants, as has been clearly shown by Parkinson (2009). The relationships between evaluation and evaluees are not egalitarian by nature and that is true even when we talk about "transformative participatory evaluation" (Cousins & Whitmore, 1998). An examination of the case studies they present in their article shows us a clear distinction between the evaluator and those being evaluated, when it is for the evaluator to decide how much and who will be part of the evaluation process (Cousins & Whitmore, 1998). In a later meta-analysis of 36 evaluation studies directed at organizational learning, the picture is the same (Cousins, Goh, Clark, & Lee, 2004).

It is beyond the scope of this article to analyze each and every participatory approach, but generally speaking, the fundamental difficulties have to do with the status of internal/self-evaluators, the difficulty they may have in observing themselves as part of the interaction (e.g., Christie, Ross, & Klein, 2004), their difficulty with generalized conceptualizations that facilitate informed conclusions, and the lack of respect among professional evaluators toward them (e.g., Barkley, 2001; Cowin, 1994; Janis, 1972; Love, 1991; Patton, 1997; Reussner, 2003; Rist, 1997; Sanders, 2002; Sonnichsen, 1988, 2000).

Another question is, who owns the knowledge? Most participatory approaches take it for granted that the evaluators as the party responsible for the data collected and the knowledge produced (Levin-Rozalis & Rosenstein, 2005).

Another important point: similar to more traditional approaches to evaluation, all of the approaches and methods mentioned above contribute to the perception that the evaluation arena has two sides: evaluators and evaluees, professionals and amateurs, external and internal, us and them. The cybernetics evaluation model addresses these difficulties.

1.3. A change in the meaning of internal and external

The terms *internal* and *external* and the relationship between them in regard to evaluation are commonly used to define the arena in which the dilemma of the knowledge gap occurs. They also form the common cognitive and practical structure used to deal with this dilemma: external vs. internal.

In spite of the fact that internal evaluation has many forms and variations (Qureshi, 1998), most of the discussion that deals with it refers to its use or implementation within organizations. See for example, Love (1991), who refers to three organizational dimensions, or Demarteau (2002), who suggests a taxonomy of eight different evaluation types that create a theoretical framework. The definition of *external* or *internal* is usually an administrative one that strengthens the dichotomous nature of the terms.

Here, I want to deal with these terms within the broader meaning of the entity being evaluated, be it a program, a community, a policy, an intervention, a department within an organization, or a culture. In this context, *internal* simply refers to anyone who is part of the framework being evaluated and who is familiar with its inner language, norms, and perceptions; *external* is less so. The notion of *external* and *internal* becomes a matter of degree. Instead of a dichotomy, we have a continuum with two kinds of expertise: a specialty in the entity being evaluated (and I don't mean professional knowledge, as I'll show later) and a specialty in evaluation methods.

I propose a different approach, one where the expertise of both sides working together is given maximum expression—an approach that at the same time, allows a smooth, efficient flow of information and knowledge between the two partner parties, thereby enhancing the quality of the evaluation outcomes: a *cybernetic* process within a system. Perceiving the evaluation

framework as a system that is holistic by definition (and within which both the evaluator and the evaluees are components) annuls the dichotomy between *internal* and *external*.

2. The cybernetic mechanism

Cybernetics, the science of organized complexity, was initially proposed as a framework for understanding communication and control in complex systems (Clemson, 1984). The word *cybernetics* originates from the Greek word *kybernetes* meaning "captain" (Wiener, 1948). It can be said that while a *system* deals with the structure, cybernetics deals with its ways of operation. This is, of course, not completely clear-cut, but for the purposes of this article, it can serve us well. I propose to deal with the process of creating new knowledge and understanding while exchanging different kinds of knowledge and actions within a complex system and its nested sub-systems—as a cybernetic process.

2.1. The systems approach

Complex social systems are generally defined as a collection of elements linked through reciprocal actions. Systems are interconnected and are usually nested, with larger systems composed of smaller systems (Corning, 2002; Imam, LaGoy, & Williams, 2006; Midgley, 2006; Schwartz, 2001). In a systems approach, phenomena both exert an influence and are mutually influenced; they are multifaceted and demand examination from within various perceptions and through a variety of concepts. A systems approach perceives the world in terms of processes, mutual relationships, and integration—creating a whole that cannot be understood through a simple summary of its parts, but only through its parts and the dynamics between them. Thus, it is essentially holistic and questions the classical linear notions of simple cause-and-effect relationships (Houston, 1999).

2.2. Cybernetics

The science of cybernetics deals with non-linear exchanges and the processes of change and stability within non-linear systems (Galuszka, 2005; Heylighen & Joslyn, 2001; Ray, 2005; Stokes, 2004; Von Foerster, 1974, 1979). When we deal with cybernetics in complex social systems, we deal with the meaning of knowledge, language, perception, communication, and self-reference and -reflection. While the system might have well-defined borders, cybernetic exchanges are open to the environment, adopting knowledge, values, and norms that might create change by supplying them to different system or sub-system components (Heylighen & Joslyn, 2001).

Knowledge is assimilated into and processed by the system and its components in ways congruent with their needs and perceptions of reality. The system's components react to it, change it, and are changed by it in the process of exchanging this knowledge with other components. Therefore, it is difficult to talk about a canonic positivistic body of knowledge; rather, we must have a discourse that constructs knowledge in ongoing procedures and mechanisms. This is also true for scientific knowledge. A scientific theory influences reality and is influenced by it, as we can easily see in any scientific field (Van Dijkum & Mens-Verhulst, 2002; Von Foerster, 1974, 1979).

2.3. Cybernetics and feedback

Systems and sub-systems have input and output among themselves. When the output of a system is fed back into the system as part of its own input, in a process whereby some portion of the output signal of the system is passed (fed back) to the input (Salen & Zimmerman, 2004), it is called *feedback*. Technically, feedback means that *A* affects *B* and *B* affects *A* and there can be numerous repetitions of this process (Clemson, 1984). If cybernetics is the science of organized complexity, then feedback is the science of cybernetics. The fact that the relationships between system elements can be as important as the nature and characteristics of these elements is what makes feedback processes so important (Emery, 1969).

Where cybernetics is concerned, we deal with a much more complex flow of information than simple feedback between the actual level and the reference level of a system, because there are many components (*C* and *D* and *E*...) that affect each other simultaneously (Clemson, 1984)—and because causality and teleology are both part of it. There is a link between the transmission of meaning and the steering of goal-related or teleological (i.e., purposive) behavior. The information is not so simple either, because when social systems are engaged, the meaning is subjective and interpretive (Wiener, 1968). This is a process of autopoiesis or self-production: the activity of the system is determined by the system itself (Maturana & Varela, 1980; Vanderstraeten, 2001).

This idea easily leads to constructivist and relativist and subjective perceptions of knowledge. Two actors in the same system will not absorb the same information from sources either outside or inside the system, nor will they perceive or weight it in the same way (Hanken, 1981).

3. The cybernetics evaluation model

I will now explain the cybernetic evaluation model and provide two examples from the field, one from the educational system in Israel and the other from an evaluation conducted in a large community program among the Bedouins, a nomadic society living in the southern part of Israel.

If we are dealing with a school system, for example, and we combine the work of internal and external evaluators of that school system, we have the external evaluation team, which possesses knowledge that does not exist in the school (or any other evaluated entity), while the school staff possesses knowledge that the evaluation team does not. Each of the parties needs the knowledge of the other, and thus a system of knowledge exchange and feedback is created.

The staff of the evaluated entity (the school) are "experts" in several fields: the everyday life of the project/organization (the school), its power relationships, ways of communication, professional fields, programs, strengths, modes of operation and conditions, culture, values, norms, and so on. They also have their professional knowledge as teachers. The evaluators are "experts" in collecting and analyzing data, i.e., observing processes and interactions and analyzing them. They have the tools and knowledge required to gather and analyze different types of information, to apply relevant models and different analytical tools. This is their field of expertise. While most teachers know very little about program evaluation, most evaluators know very little about teaching. Here, we have the knowledge gap, which is described simply in Table 1, below.

Evaluators cannot function without the information that exists within the evaluated entity, and in most conventional evaluations, they gather this knowledge in one way or another. We usually do not see the people being evaluated as equal partners in the evaluation process, which is perceived as the responsibility of the evaluators alone. As a consequence of that responsibility, evaluators tend to lead the evaluation process. That is also true for most participatory approaches. Even in those cases where the evaluees play a relatively active role, it is a role scripted by the evaluators. Because the evaluators' knowledge about the evaluated

Table 1
The knowledge gap between the evaluation and school teams.

Knowledge owners	Knowledge types	
	Professional knowledge of evaluation	Knowledge about everyday life and professional knowledge of the evaluated entity
Evaluation team	High	Low
Evaluee	Low	High

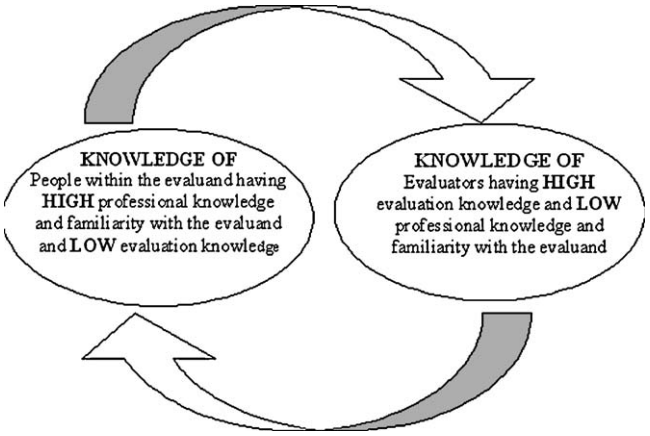

Fig. 1. The cybernetic relationship of knowledge transfer.

body is less than that of the evaluees, by leading the process, the evaluators risk losing many parts of their evaluees' knowledge and abilities.

The cybernetic approach aims to combine these two bodies of knowledge into one, by turning the knowledge gap from an obstacle or a dilemma to an engine for the cybernetic process, which is represented simply in Fig. 1.

A cybernetic evaluation system of interdependent feedback is a cyclic multidimensional process involving the mutual influences of evaluators and evaluees on the means of gathering and processing information. Feedback is driven by the hierarchy existing between the knowledge resources of all parties.

It differs from many other formative and collaborative evaluation approaches in three different levels: (a) the perception of the evaluation power relationships and role distribution, (b) the process of work, and (c) the outcomes and products. Each of these addresses the fundamental difficulties in participatory methods that have been mentioned above, as shown in the following discussion:

(a) *Perception*: There are several aspects of evaluation that have to be changed in order for the cybernetics process to flow. First, we have to perceive it as a system that is neither hierarchical nor linear. The first obvious step is for the evaluators to see the evaluees as equal partners in all related issues, beginning with stereotypes and prejudices and ending with professional social representations. The process has to be perceived not as one group (external experts) that invites another group (internals) to take part in a process being led by the externals, but rather as two equal groups of experts working together: the external evaluators (who are experts in evaluation) and the internal people who are experts in their professional fields and who own the knowledge of their own lives, and thus are experts in the know-how, values, norms, and perceptions in their world.

One of the most important changes is the notion of trust. Trust is a system-related concept and is a continuously evolving state of information gathering, processing, and feedback. We evaluators are usually trained to gain the trust of our evaluees. Here, we have to reverse the direction and to learn to trust not only their knowledge but also their ways of doing things, which are often very different than ours. We have to be ready to sit in the passenger seat for many parts of the journey and to let the evaluees drive.

(b) *The process of work*: How, then, can the principles of cybernetics be put into practice? It is essential to form joint teams of evaluators and evaluees—as equal partners with equal status but with different expertise. That means that the evaluation team concedes its role as the leader of the process and permits itself to be led. In other words, we want to create what Gorodetsky, Barak, and Harari (2007) and Gorodetsky and Barak (2007, 2008, 2009) call a "participative-edge community," which is an artificially established community (or group) that attempts to bridge the gaps between different institutions or between members of the same institution who have different responsibilities or mindsets. In such a community, the different voices serve as a framework for revealing the multiplicity of understandings that mold the participant's new knowledge. In order to create a participative-edge community, a chain of collaborative working groups, combined of equal members, has to be built at each level (and location) of the program. I will elaborate more about this process and demonstrate it below. All members have equal responsibility for raising questions, deciding on procedures for data collection, analyzing the data, and drawing conclusions from it.

(c) *Product*: There are several "products" to an evaluation process but the most important one, and the one that is a precondition to all others, is knowledge. And in a cybernetic evaluation process not only is the knowledge created by all participants working together, it is also possessed by all of them. And these two aspects – creating knowledge and possessing knowledge – do not necessarily go together. Even in formative or participatory evaluation processes when evaluees are partners to formulating evaluation questions and in data gathering, they are not always partners to the process of converting the paths they helped the evaluators to explore into a map that can be understood by any traveler. Nor have they any possession of that map. It is usually in the evaluators' possession.

4. Abduction, the logic of discovery: the research logic

The research *logic* (to distinguish from research *methodology*) adequate for a cybernetic process is the abductive research *logic*, the logic of discovery, that was first defined by C.S. Peirce at the beginning of the 20th century. It involves a process of searching for explanations of facts without prior knowledge or hypotheses. Peirce formulated this "abductive" research logic to cover what he called "the logic of discovery" (Peirce, 1955a,b; Rescher, 1978; Rosental, 1993). It is different from the well-known *deduction* and *induction*.

In deductive logic, a valid logical connection exists between the hypotheses and a previous theoretical assumption. The hypothesis is explained by deductive premises derived from a theory. There is nothing new in the hypothesis, nor is anything new permitted (Copi, 1961; Copi & Burgess-Jackson, 1995; Levin-Rozalis, 2000a, 2003). Deductive logic is the opposite of the logic used in a cybernetic process because a preliminary theory will block the open-ended inquiry needed.

In inductive logic, hypotheses are formed according to generalized phenomena that are observed in the field. In an attempt to formulate a general law of probability, these hypotheses examine the probability that these phenomena will be repeated (Copi, 1961; Copi & Burgess-Jackson, 1995; Levin-Rozalis, 2000a, 2003). Since we do not know what phenomena we will meet, this research logic is inadequate as well.

According to Peirce, during a process of discovery, we are confronted by a new or surprising fact (a problem), we decide how to address it, and then we create an explanation. According to this research logic, we do not cling to our first interpretation of a new or surprising fact, but rather convert the explanation into an ''hypothesis on probation'' and test it against all our observations and facts to see if it stands. By doing so, by continuing the process of examining our hypotheses against additional information gathered from the field being studied and against logical criteria that corroborate the interpretive process, we have to explore farther into a wider scope of data. In each such cycle, our explanations become broader, more general, and more abstract. With this logic, Peirce created an inseparable link between new facts (which we face in the ''real world,'' as it is perceived in our minds), their explanation, and their conceptualization (Levin-Rozalis, 2000a, 2010; Peirce, 1955a,b; Yu, 1994). A hypothesis on probation is said to meet the logical criteria—not if it corresponds with a conception of external reality or theory, but rather, only if it resolves the dilemma, problem, or difficulty for which it was formulated (Josephson & Josephson, 1996; Levin-Rozalis, 2004, 2010).

The following case study demonstrates a cybernetic process of collaboration between an external evaluator and the staff of a school and illustrates the implementation of this procedure.

5. Case study 1: a cybernetic process of cooperation between an external evaluator and school staff

The organization: a large school in Israel that covers six grades across junior and high school. The school is considered a good one with real *esprit de corps*. At virtually any hour of the day or evening when I visited the school, I found it bustling with activity, from the basketball court (which was always in use) to the staff rooms (which were usually occupied by teachers, student groups, or mixed groups of teachers and students). The school has three big demonstration programs that operate simultaneously. One is for inquiry, which is aimed at the entire junior-high school. For 3 h a week, the students split into relatively small working groups and, together with all the junior-high teachers (homeroom teachers as well as the teachers of specific subjects), they ''do inquiry.'' The second program, *ma'avarim* (transitions), was initiated by the school itself. It deals with easing the transition from the junior to the senior grades, a transition that over the years has led to a crisis for many students. The program is aimed at ninth- and tenth-grade students and primarily involves mentoring by older students and attaching a teacher-counselor to each group. The third program, *shiluvim* (integrations), is also an initiative of the school, started by a group of senior-high subject teachers. It is based on learning ''lateral'' rather than disciplinary subjects. The teachers choose a subject, which is then taught from the different perspectives of the humanities, social sciences, and when possible, also the sciences. Thus, for example, the question of an individual's place in a group could be taught through a poem in literature, a chapter in sociology, a biblical story, or a topic in geography, zoology, and botany. The subjects are chosen and processed by the teachers.

The school decided to apply an evaluation process to these programs, which I accompanied as an external evaluator. Perceiving and analyzing this process using systems thinking and cybernetics, changes the structure's power relations into system components that, by their very definition, are equal in their ability to influence the system and the cybernetic flow within it. Defining the system borders so as to include the evaluator diminishes the notion of external and internal. Now the entire school and the evaluator are a system with many subsystems nesting in it, such as the program staff, the pupils, different groups of teachers, and so on.

That is the theory. And in practice? In the first stage, two teachers per program were chosen to be part of the evaluation team, which comprised six teachers and myself. The school principal and her deputy attended the team's meetings when their schedule permitted. That was the ''evaluation group,'' and the teachers happily adopted the title of ''teacher-evaluators.'' Several meetings were devoted to understanding each other's field and planning the work process. In these meetings and all other meetings, feedback was the main working process. If, for example, the evaluator suggested a way of collecting data, the ''teacher-evaluators'' would react with important information about norms, language, sensitivities, and so on. The evaluation goals, questions, and tools were a product of the group rather than of the evaluator.

In the second stage, we planned the evaluation process. It was decided that teams of involved teacher-evaluators would be used (with pairs of teachers coming from two different programs). It was further decided that each team of teacher-evaluators would observe and interview colleagues from a program in which they were *not* involved. In the teacher-evaluators group, we discussed the issue of how to conduct an interview, how to listen and respond in a non-judgmental way, how to ask questions that would not be perceived as criticism and that would enable additional information, how to ask for stories and facts rather than opinions, and so on. In spite of my experience in evaluation, I did not know what kind of approach would be the most effective to use in a ''colleague evaluation'' in that specific school, but the teacher-evaluators knew. The school, they claimed, was pupil-oriented; thus the use of teacher–pupil settings for the interviews would be the most appropriate because teachers were used to spending a lot of time explaining and teaching.

In the third stage, the teacher-evaluators observed program activities, interviewed the program staff, and asked them in an open discussion to ''teach'' them the program, how it operated, what happened in it, and so on.

In the fourth stage, in the course of two meetings, the evaluation team (i.e., the teacher-evaluators and me) analyzed all the material. My role was to give them feedback on their analysis, i.e., to keep an eye on rigorous and methodical analysis and to supply the teacher-evaluators with knowledge about approaches to analyzing interview content, how to identify stories and distinguish them from opinions, how to define themes and trace them along the interviews, and so on. The teachers' perceptions of the programs and their processes were revealed, as were their perceptions of the weaknesses and strengths of the programs. When something in the interviews was unclear, the teacher-evaluators who belonged to that particular program were able to expand and add explanations and interpretations. These explanations turned into hypotheses on probation and were checked against more data and observations.

We created feedback loops: they reacted to each other's analyses from different points of view (especially as insiders or outsiders to the program, but their professional field played an important role as well). I reacted to their method of working (especially the tendency to choose data that confirms their own assumptions instead of looking at the entire body of findings). All in all, a new body of knowledge and of understanding the school emerged.

The findings were surprising to the teacher-evaluators and, later, to the staff. In contrast to the school pride, we discovered, for example, that the teachers in the inquiry program were frustrated because, although the children liked the program, they were still ''treading water'' and the papers they were submitting were far from meeting the expectations of the teachers. In *ma'avarim*, the mentoring program for the transition to senior-high, the teacher-counselors felt that despite the success of the activities, there was no ''actual program'' since all the work was conducted on an

individual basis and each teacher-counselor felt alone. "I have extensive knowledge and experience," one teacher said, "but there's no one to hand the baton to." In the *shiluvim* program, the teachers felt lost. They worked very hard, continuously having to reinvent the wheel. They could not see where the program was leading. They felt it was a case of "a bombastic title with no content to support it," attended by hard work, the purpose of which was not always evident.

An overall understanding appeared. Despite the hard work and the good ideas, the school and its staff lacked the capability for systematic work, such as defining goals and means and constructing knowledge from their own experience. What should be done? In a conventional evaluation process, the findings would be presented to the programs' teams to deal with. Here, we duplicated the way an evaluation team would work. We thought it important for the teams to conceptualize the problems for themselves. Nevertheless, we worked on skills, such as how to avoid an emotional argument or personal debate, how to respond to blunt remarks, and how to defend the findings without suggesting interpretation.

In the fifth stage, the teacher-evaluators returned to the program staff with the processed findings. A summary of the interviews, including the number of teachers who made each claim, and sample quotations, were distributed to the program staff in advance. Two of the three groups were somewhat stunned by the severity of their own words. The strength of the group statement was greater than all the "grumbling" in the staff room. This led to a discussion within the program groups. The discussion in the inquiry group, for example, had the results shown below.

5.1. Issues related to the program's content

- What are the *objectives* of the program, i.e., what should be emphasized? The product? The written paper? The practical work? Were other products possible? What are the criteria for the product? Is the inculcation of learning and inquiry skills the most important thing? If so, what skills?
- What is the *rationale* of a program that combines so many fields? The regular subjects of study? The specific field of inquiry? Information-gathering skills? Information-processing skills? Writing skills? (Each of these areas mandates mastery of a wide variety of skills.) What is the basis of the program? What do we hope to achieve as an outcome of the program?

These issues led to reflections about the learning being split into 3 years:

- How should the content be organized in practice, and how should the various fields of study be integrated?
- What skills should be taught? When?

5.2. Issues related to the program's work processes

- How can the individual knowledge accumulated by each staff member be transformed into the group's general knowledge?
- How can a structured corpus of knowledge be formulated (documented) in a way that can be passed on?
- How can a feedback process of ideas and methods of application be created?
- How can the knowledge be passed on to new teachers?

5.3. Issues related to the program's organization

- What skills are required from teachers participating in the program?
- How can teachers be provided with the skills they lack?
- How should the teachers working together be teamed up?
- How can a group work process be created?
- How should the program be led, and what is expected of the leading team members?

This process was not concluded in a single meeting, nor was it simple. The important thing is that the teacher-evaluators participated in these groups as an external resource, in that they were not involved in the discussions, but observed them. Consequently, they were able to mirror to the group members points at which the discussion stalled, due, for example, to "silenced" issues. (Example: it is unacceptable to say that conventional learning is more effective than inquiry learning when the accepted belief is that inquiry is the best solution.) They were able to expose interpersonal elements that stalled the discussions, such as a teacher who is a "red flag" in the sense that as soon as she opens her mouth to speak, she comes under attack. They were able to give feedback by mirroring beliefs that make practice impossible, such as the statement in the *ma'avarim* program that "every child is different," which prevented the teachers from seeing what is common among the children and thus defining a corpus of knowledge that would enable continued work. They were able to help tacit knowledge to become explicit. I was sometimes invited to attend these meetings, but they were usually conducted as internal staff meetings. The teacher-evaluators, with their new acquired knowledge and external point of view, were enough of a catalyst for the cybernetic process to take place.

After each round of meetings within the programs, I met with the team of teacher-evaluators. We discussed their findings, the processes they had observed, and the information they presented. Together, we checked where the groups were in terms of group processes, but we also checked their insights against our interpretations, a process that often created a deeper understanding that, in its turn, helped the teacher-evaluators to function in the program staff meetings.

In Fig. 2 we can see the knowledge gap in two major bodies of knowledge (obtaining and analyzing data, and familiarity with the evaluand) that enforced the cybernetic process, i.e., the flow of

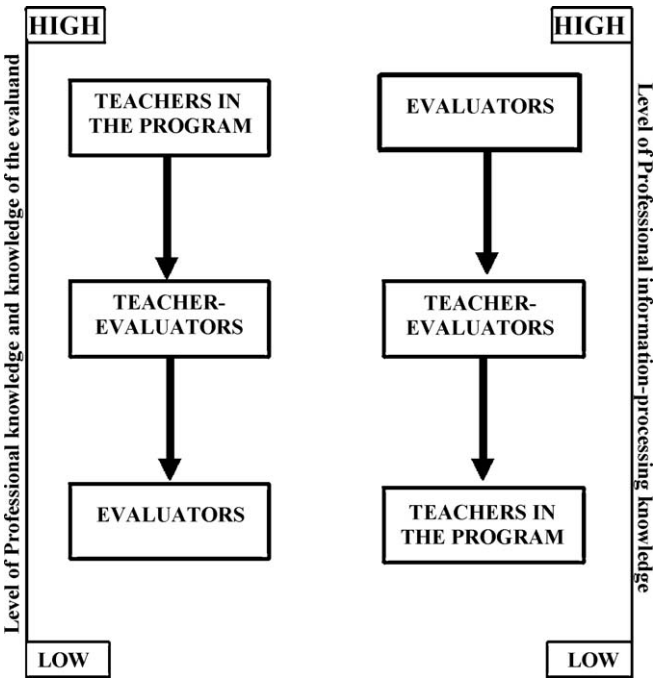

Fig. 2. A cybernetic model of information flow in a school evaluation.

knowledge and the exchanges that enabled the team to work together and to create a joint product.

6. Case study 2: a cybernetic process of cooperation between external evaluators and a community program

In the second example, the knowledge gap between the evaluation team and those being evaluated was even greater. In this case, the evaluation was initiated by the funding agency of a local Bedouin association, which also posed the evaluation questions. The system here was defined as a combination of the different groups being evaluated and the evaluation team. The evaluation team handed the role of leading the process over to the volunteer steering committee, putting aside the funder's questions. In several long, unstructured meetings, the steering committee (SC) explained their association activities to us (the evaluators). These presentations were accompanied by long discussions among themselves, raising important questions and issues. Apart from asking for clarification, the evaluation team did not intervene. We were passive listeners, absorbing the information as it came. At this point, we did not want to guide the SC with our questions.

The SC then appointed an "executive team" combined of mid-level workers in the association and representatives of the evaluation team. The role of the team was to plan the data collection that would answer the SC's questions. The association's workers, knowing their community and its restrictions and the abilities of their own non-professional staff, thought of all kinds of ways to collect the data—excluding interviews or questionnaires, which are not adequate tools for this population. (Many Bedouins, especially women, are illiterate and the Western concept of an interview is unfamiliar to them—and almost impossible to conduct because of cultural restrictions and suspicions.) The cultural barrier for the evaluators was also considerable because the Bedouin population mostly speak their own Arabic dialect; whereas, the majority of the evaluation team spoke only Hebrew. In the end, the data were collected solely by the association's field workers during association activities, at special meetings, and during home visitations.

Working together was a must. The association people knew practically nothing about evaluation or research methods, and the evaluation team's access to the population was limited. Here again, the limitations of both teams were turned into a cybernetic engine. The local people had been given the leeway to do things in the fashion they themselves determined to be best. It was their idea to collect stories and anecdotes using free "by the way" conversations. The evaluation team helped provide information on how to keep the data as reliable as possible, how to document its collection, and so on. The active role of the evaluators commenced when the workers began to come with the data they collected, which arrived in different forms, mostly as anecdotes and stories, as planned. Thus began the analysis process, which was done rigorously using abductive research logic.

As one might imagine, the data we received from the field workers appeared to be rather chaotic. Using a hermeneutic method of analysis together with the abductive process enabled rigorous processing of the data (Levin-Rozalis, 2005). The "executive team" sat with the field workers and heard story after story. Together, they analyzed the information in any way possible (looking at content, themes, structure; counting events and other countable information; and so on). It was more a kind of brainstorming than a systematic analysis. The field workers and the association people of the executive team just said what they saw in or understood from the stories and anecdotes. The evaluation people organized these observations into categories that all participants agreed upon.

After analyzing several stories and anecdotes, some major issues began to take shape. We could draw some preliminary conclusions, which we turned back into assumptions and examined in several ways: asking the field workers and the mid-level workers for their opinions, looking for supportive data in other stories and anecdotes, and in some cases, asking the field worker to gather more information or more specific information. The process of information transfer and knowledge exchange between the evaluators and the field workers was reciprocal—and provided a better understanding of the findings. In this way, the knowledge of data analysis and the cultural knowledge of the people from the community were both used to improve the process as a whole.

It was a long process, during which the evaluation team developed a broad understanding of the operation of the association, the population involved, the strengths, and the problems, as well as a clear understanding of what could be achieved and how, and what could not. A vast amount of data was gathered, analyzed, and processed. We had more data than we bargained for and, not surprisingly, we had enough data to answer the funder's questions, despite the fact that we did not direct the data collection or even the stage of determining the evaluation questions. During this process, the association staff learned the importance of data and of asking questions, along with ways of gathering and analyzing information. They also learned a lot about their own work processes, hidden assumptions, and results.

7. Discussion

If we return to the old argument about what is preferable – a professional evaluator who complements knowledge in the discipline of the evaluated subject, or a professional in the evaluated field who complements evaluation knowledge – the answer has to be *both*. While this might be obvious to many, I want to take this notion of "both" one step farther. I would like to claim that we can turn the two entities in "both" into one by creating a system defined to include all parties and by initiating a cybernetic flow of information within this system, as I have shown in the case studies.

I would also like to return to the three levels that, I believe, distinguish this approach from other models/approaches: (a) the perception of the evaluation power relations and role distribution, (b) the process of work, and (c) the outcomes and products.

7.1. Perception

In the two case studies presented here, all participating parties had equal status, even if not equal roles. On one level, it was because of our way of perceiving it as a system that is holistic by nature; on a more practical level, it was clear from the beginning that the evaluees had knowledge that was not only not possessed by the evaluators, but which was essential to the evaluation processes and products. This was not just a nice declaration. As described in the case studies, the evaluators trusted the expertise of the evaluees about their own world and profession and enabled them to lead the process, beginning with formulating the evaluation questions, through the processes of data gathering and analysis, to conceptualizing the findings and the conclusions.

7.2. The cybernetic process

I wish to reemphasize the following points:

- It is important to try to keep the professional role definitions of the evaluator and the evaluees separate. This does not mean that the evaluator cannot express her/his opinions or that the

evaluees cannot suggest anything related to the evaluation process. On the contrary, it means creating a team of equals that consists of people with different areas of expertise, all of which are needed equally in order to fulfill their mutual task. And more than that, the exchange of information and knowledge between the members of the team is necessary for the cybernetic process, which enables the emergence of knowledge that none of them could create alone.

- In these examples, the external evaluator had no ownership over the process or the knowledge that was constructed during the process (Levin-Rozalis & Rosenstein, 2005). The knowledge remained the property of the evaluated entity for its own use. In each cycle of this process, the role of the evaluator remains that of an external eye that deals with data and data analysis, leaving decisions about the best way to collect or interpret the data to the "internal" people.

In the school, the professional knowledge of the teachers (both those in the team of teacher-evaluators and those in the program teams) played a major role. The teachers analyzed the programs from both the didactic and the organizational aspect. In order to structure the program in a more informed manner in didactic terms, they used both their professional knowledge as teachers and their knowledge of the school and its culture. This helped to adapt the evaluation process and the programs to the character of the school and its teaching staff. The same is true in the second example in which the professional knowledge of the community workers and the cultural knowledge of both the community workers and the field workers were required to achieve a worthwhile evaluation.

In both examples, nothing could have been achieved without the evaluator's knowledge of how to obtain and analyze data.

The complex, ongoing feedback system of the cybernetic process can be applied at any point in the mutual work. Each item of feedback engenders feedback from the other party in the dialog. In the school evaluation, the team of teacher-evaluators created a participative-edge community with the program staff, and together they analyzed the information from the program. The external evaluator and the teacher-evaluators created another participative-edge community and responded to the material presented by the teacher-evaluators, thus compelling them to respond to the external evaluator's responses, whether by means of a more in-depth explanation or by further organization of the material, which the team members took back to the program staff as feedback, and so on. Each of these interactions expanded the knowledge, understanding, conceptualization, and construction of the processes at each of the junctures, thus contributing to the next encounter with the next team.

Creating appropriate abductive processes (which are open enough, emerge from local knowledge, and rely on locally accepted procedures) can ensure the validity of our data, broaden the evaluation knowledge of our evaluees, and (because the whole process is part of their own way of doing things) enormously increase the chances of sustainability.

7.3. Product

By creating participative-edge communities of joint interdisciplinary teams of evaluators and people from within the evaluand (who contend with evaluation issues from their own professional point of view), the use of a cybernetic process of knowledge streams can contribute to both sides—to a better understanding of the evaluated subject and of evaluation itself. It can contribute to the learning process in the evaluated body (enabling the evaluees to reflect on their own learning processes) as well as to improving its professional work. The same is true for the evaluation teams. In both cases, unconventional ways of evaluation were implemented, which nevertheless brought better (and no less rigorous) results than any conventional setting or tool.

The cyclic process described above contributed to the learning of the school as a whole, to improvement of the programs, and to real grappling with the ambiguities and weaknesses in the school, based on an understanding of its needs. All the knowledge was constructed by the teachers for themselves, their students, and their school.

The same is true for the second example. The shared cybernetic process not only led to a better understanding of an otherwise unfamiliar community on the evaluation side, but also to conclusions that were connected to the association and to the reality of the community. Consequently, it also contributed to more relevant recommendations, since, as a shared process, it overcame a great deal of resistance and misunderstanding, which, as we know, can impede an effective evaluation process (Oliver & Montgomery, 2001).

7.4. Last word

The dichotomy between *external* and *internal* disappeared and the distance between the two edges of the continuum was reduced to a team, combined of experts in different fields, working together. In other words, it bridged the knowledge gap between the local and the universal, the internal and the external.

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