Defining, Illustrating and Reflecting on Logic Analysis with an Example from a Professional Development Program.

Abstract

Program designers and evaluators should make a point of testing the validity of a program's intervention theory before investing either in implementation or in any type of evaluation. In this context, logic analysis can be a particularly useful option, since it can be used to test the plausibility of a program's intervention theory using scientific knowledge. Professional development in public health is one field among several that would truly benefit from logic analysis, as it appears to be generally lacking in theorization and evaluation. This article presents the application of this analysis method to an innovative public health professional development program, the Health Promotion Laboratory. More specifically, this paper aims to (1) define the logic analysis approach and differentiate it from similar evaluative methods; (2) illustrate the application of this method by a concrete example (logic analysis of a professional development program); and (3) reflect on the requirements of each phase of logic analysis, as well as on the advantages and disadvantages of such an evaluation method. Using logic analysis to evaluate the Health Promotion Laboratory showed that, generally speaking, the program's intervention theory appeared to have been well designed. By testing and critically discussing logic analysis, this article also contributes to further improving and clarifying the method.

Keywords: logic analysis; intervention theory; theory-based evaluation, program evaluation; logic model.[1]

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Highlights

- Logic analysis is a specific evaluation approach that can be used to test the plausibility of a program's intervention theory.

- This paper presents a logic analysis of the Health Promotion Laboratory program, a public health professional development program.

- The logic analysis helped to identify the program's strengths and weaknesses.

- Logic analysis has proven to be a useful method for strengthening a program's theoretical basis and facilitating program improvement.

1. Introduction

Ideally, a program's intervention theory should reflect the mechanisms by which the intervention produces the desired outcomes. Too often the intervention theory, which stipulates the links between a program's resources, activities and effects, does not represent the way in which the program actually produces its effects, but rather the program designers' perceptions and beliefs about the causal mechanisms (Brousselle & Champagne, 2011; Weiss, 1998). Using theory-based evaluation, these perceptions and beliefs can be tested. Testing the validity of a program's intervention theory before investing either in implementation or in any type of evaluation would improve the potential of the program (Brousselle & Champagne, 2011). In this context, logic analysis

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[1] **Abbreviations:** CSSS = Health and Social Services Centres; DSPM = Public Health Directorate for Montreal.

can be a particularly useful option, since it can be used to test the plausibility of a program's intervention theory on the basis of a multidisciplinary integrative theoretical framework using scientific knowledge (Brousselle & Champagne, 2011; Brousselle, Contandriopoulos, & Lemire, 2009; Rey, Brousselle, & Dedobbeleer, 2012).

Logic analysis is a relatively new approach in the stream of theory-based evaluation. In recent years, there have been a few concrete experiences and applications of logic analysis (Brousselle & Champagne, 2011; Brousselle et al., 2009; Rey et al., 2012), and we believe it still needs to be tested and refined through its application in different settings. Our aim in this paper is to contribute to the knowledge in this field by (1) defining the logic analysis approach and differentiating it from other theory-based evaluations; (2) illustrating the application of this method by a concrete example (logic analysis of a professional development program); and (3) reflecting on the requirements and pitfalls of each phase of logic analysis, as well as on the advantages and disadvantages of using such an evaluation. In so doing, our intention is to further improve and clarify the method.

Professional development in public health is one field among several that would truly benefit from logic analysis, as it appears to be generally lacking in theorization and evaluation (Gotway Crawford et al., 2009; Koo & Miner, 2010; Tilson & Gebbie, 2004). The example chosen in this article presents the application of this analysis method to an innovative public health professional development program, the Health Promotion Laboratory.

2. Logic analysis: what it is and how it differs from similar trends

Logic analysis is a type of evaluation that fits within the broader stream of program theory evaluation, or theory-based evaluation (Brousselle & Champagne, 2011). The purpose of theory-based evaluation is to question the validity of a program's intervention theory by collecting "data to see how well each step of the sequence is in fact borne out" (Weiss, 1997) (p. 501). To do so, theory-based evaluation deconstructs the program's causal mechanisms and identifies which elements and factors are responsible for its success or failure (Weiss, 1997). "They seek to show how the intervention is expected to work or make a difference" (Mayne, 2012) (p. 271).

Logic analysis can be conceived as a specific type of theory-based evaluation. With formative or summative aims, logic analysis allows to test the plausibility of an intervention theory based on available scientific knowledge—either scientific evidence or expert knowledge (Brousselle & Champagne, 2011; F. Champagne, Brousselle, Contandriopoulos, & Hartz, 2009). Logic analysis, which can take two different forms (direct or reverse), may be used (1) to identify the crucial characteristics and critical contextual conditions needed for the program to produce its intended effects (direct logic analysis); or (2) to identify alternative means of action and better ways to produce those effects (reverse logic analysis). In fact, direct logic analysis of the intervention's theory will determine whether it is appropriate for obtaining the intended results (Brousselle & Champagne, 2011; Rey et al., 2012). It thereby makes it possible to identify the crucial characteristics of the intervention and the contextual conditions for achieving the effects

(Rey et al., 2012). Taking the inverse path, reverse logic analysis starts from the desired results and identifies the best interventions to achieve them, by exploring alternatives and broadening the array of possible interventions that could be implemented (Brousselle & Champagne, 2011; Rey et al., 2012). This reverse analysis also helps to identify the crucial conditions needed to implement the alternatives and produce the effects (Rey et al., 2012). In this study, direct logic analysis is used to validate the design of the intervention and identify its crucial components as well as the critical conditions needed to achieve the results. An inverse logic analysis would have helped to identify other interventions to achieve the outcomes targeted by the project's promoters as well as to specify the critical conditions needed for those interventions.

Logic analysis usually proceeds in three phases (Brousselle & Champagne, 2011; F. Champagne et al., 2009; Rey et al., 2012). The first phase consists of representing the intervention theory through a logic model that specifies the links among resources, processes and results. In the second phase, based on the scientific literature, an integrative framework is developed within which the logic model of the intervention and its underlying premises will be examined. This phase thus involves studying the literature that analyzes and documents mechanisms similar to those attributed to the intervention. The aim is not to carry out a systematic literature review, but rather to provide a representative synthesis of the most recent knowledge in relevant and meaningful fields of research. The third and final phase consists of taking a new reading of the intervention in light of the integrative framework developed. This makes it possible to compare the

intervention theory against the model that emerges from analysis of the literature, which helps bring to light the intervention's strengths and weaknesses.

It may be useful to consider how logic analysis differs from other theory-based evaluations, such as evaluability assessment, contribution analysis, or realistic evaluation (see Table 1). Logic analysis tests the intervention theory to determine whether a program is appropriately designed to achieve the desired results, based on scientific and expert knowledge. Evaluability assessment, in contrast to logic analysis, is a normative strategy which uses the intervention theory to assess the program implementation's compliance with the intended program (Smith, 2005; Wholey, 2004). Contribution analysis, on the other hand, could be considered a post-implementation impact analysis strategy which uses the intervention theory to assess the program's contribution to the observed result (Mayne, 2008, 2012). Realistic evaluation is another theory-based evaluation method which uses a highly specific intervention theory (called the 'context–mechanism–outcome pattern configuration') that is tested empirically against the program's reality (R. Pawson & Tilley, 1997; R. Pawson & Tilley, 2008). While realistic evaluation is rather different from logic analysis, realist review, which emerged from realistic evaluation, shares many similarities with direct logic analysis because it can be used to understand and document how the intervention works with regard to existing theories and research (R. Pawson & Tilley, 2008). As such, realist review could be conceived as a potential literature review strategy when doing direct logic analysis (Brousselle & Champagne, 2011).

Table 1. Comparison of theory-based evaluation approaches and questions asked

Evaluation approach	Question asked
Logic analysis	Is the program designed in a way that can logically produce the desired results?
Evaluability assessment	Is the program implemented as planned, so that it is ready for summative evaluation?
Contribution analysis	To what extent are the observed results due to the program's activities rather than to other factors?
Realistic evaluation	What works, for whom, in what circumstances and in what respects, and how?

The emerging movement of theory-based evaluation and its related approaches over recent decades is evidence of the evaluation field's interest in giving more prominence to change models in evaluative processes (Coryn, Noakes et al. 2012). This movement will consolidate in the coming years, as understanding of the strengths, specificities and application possibilities of these approaches increases. This article is intended to contribute to this consolidation by presenting and discussing the application of logic analysis to a professional development program, which is the subject of the next section.

3. Logic analysis: a concrete example from a professional development program

The case presented in this article, the Health Promotion Laboratory, is an innovative program without precedent in the professional development field. As such, no comparable project was available in the scientific literature to support this program's conception. Its development was based mainly on the tacit and experiential knowledge of the public health professionals who were its architects. A direct logic analysis was used to evaluate whether the Health Promotion Laboratory program was designed in a way

that would effectively produce the desired results and to uncover any aspects that could be improved.

3.1 Construction of the logic model: The intervention and its resources, conditions, and activities

In 2009, a team from the *Direction de santé publique de Montréal* (DSPM; Montreal Public Health Directorate) of the *Agence de la santé et des services sociaux de Montréal* (Montreal's Health and Social Services Agency) developed a type of support that combined professional development, reflective practice and community of practice in the form of a 'Health Promotion Laboratory'. This project was conceived in response to concerns expressed after the 2004 healthcare reform in Quebec, which attributed new public health responsibilities, including a health promotion mandate, to health and social services centres (CSSSs).

The purpose of the Health Promotion Laboratory program is to support, innovatively and flexibly, the multidisciplinary CSSS teams working on particular issues (e.g. student retention, occupational health) and to help them improve and develop new health promotion practices. The promoters of the intervention had four specific objectives that targeted different levels and defined different outcomes: *(1) co-construct new ways of addressing local public health issues; (2) develop a reflective practice; (3) broaden professional competencies; and (4) initiate organizational changes to facilitate the adoption of new (health promotion) practices*. The descriptions of the program and of its resources, conditions and activities presented in this section are based on the presentation

documents prepared for the program by its promoters, the working documents of the program's developers, some sessions of direct observation of the laboratory' operations, as well as some meetings with the DSPM team. These different information sources were used to build the logic model of the program in the first phase of logic analysis.

Concretely, the laboratory consists of about 10 participants, both health professionals and managers, who have voluntarily agreed to become involved in the process. The formula involves attending three-hour meetings every two to three weeks in a process that can span two to three years. The meetings are held during the employees' normal working hours; the employees are freed up by the CSSS so they can participate. Besides agreeing to create this space and time for the laboratory, the CSSS must also provide resources to support the laboratory's work (e.g., lighter workloads, computer access, time for documentary research, pairing of professionals, etc.). Laboratory meetings are led by one of the participating professionals or managers. During the process, the team is guided, supported and directed by facilitators from the DSPM. Experts from the DSPM serve as potential resources for the teams, as needed. The DSPM also provides $17,000 per year to support training for managers, professionals and other program participants.

The laboratory has no ready-made underlying formula. A broad operational approach is proposed by the DSPM but is meant to be adapted to the preferences and needs of the team. As such, the adopted approach leaves room for the team to explore different directions and activities depending on the group's dynamics and the participants' needs. The iterative operational process suggested to the teams by the promoters is divided into

seven phases (Table 2), corresponding to different intermediate outcomes pursued by the

program. In Phase 1, the participating CSSS identifies a particular public health problem

(designated as the 'issue', e.g. student retention, occupational health) and assembles a

team ready to work on this problem. This phase involves a significant investment from

the DSPM experts to present and explain the program to the managers involved, to bring

them on board and get their support. In Phase 2, the team involved in the laboratory

understands and accepts the proposed operational process, and identifies and discusses

actions to reduce constraints and optimize incentives for participating in the laboratory.

Participants are involved in defining the process by choosing, for instance, the sequence

of the various phases. They may return to this phase often over the course of their work.

In Phase 3, the laboratory encourages participants to acquire the basic concepts of public

health through reading, discussions, exercises to understand the links between practices

and concepts, etc. Participants are also invited to present their vision of these concepts

and of the program through articles in the internal newsletter or in professional journals,

at presentations in team meetings, etc. In Phase 4, the teams identify the specific angle

from which they want to address the issue (which can be considered as selecting a

determinant of the problem). To do this, they need to explore and interpret data on the

health of the population in their territory, and to collect and analyze other data as

required. This phase also involves constructing a shared understanding of the issue. In

Phase 5, the team discusses various options for interventions to address the issue from the

chosen angle. For this, they may explore what interventions are possible in health

promotion and examine the participants' current practices in this field. This phase ends

with a collective decision on the health promotion intervention to be developed. In Phase

6, the team sets up partnerships with the community actors affected by the health promotion intervention that will be developed. This phase involves developing an understanding of the concept of partnership, discussing and defining what types of partnership are to be pursued in relation with the issue, identifying key partners, etc. Finally, in Phase 7, the laboratory culminates in the implementation of the health promotion intervention. To do this, the team must, in particular, develop the logic model of the intervention, develop the intervention instruments, and set up an intersectoral coordination committee with the partners.

Table 2. Phases of the operational process and related activities

Phases	Examples of activities in each phase
(1) Identify an issue and a team	Present the laboratory to the CSSS management; choose a team interested in the project; select an issue.
(2) Specify the operational process	Present the process; involve the participants in sequencing the various phases of the process, etc.
(3) Acquire basic concepts of public health and a space for reflection	Read; do exercises to acquire key public health concepts; write articles about the program for the internal newsletter, etc.
(4) Study the problem (issue) more deeply	Discuss the angle from which the issue would best be addressed; interpret data on the health status of the territory's population; collect, analyze and interpret data to support the choice of issue, etc.
(5) Identify options for action	Discuss relevant health promotion interventions (strategies used, determinants affected, changes targeted); decide collectively what action will be developed in relation with the identified issue, etc.
(6) Develop partnerships	Undergo training on working in partnerships; discuss the benefits and inconveniences of sectorialized action versus working in partnership; define the partnerships to be pursued in relation with the issue; identify key partners, etc.
(7) Implement a new health promotion action	Develop a logic model for the intervention, develop

	intervention instruments; set up an intersectoral coordination committee with partners, etc.

Health promotion laboratories require certain contextual conditions that the promoters consider essential for their success. Contextual conditions relate to the key characteristics of the organizational environment (CSSS) and of the participants that do not necessarily appear in the descriptions of the operational process and of the laboratory's functioning. These are most often referred to as "conditions for fulfilment" by the DSPM in its presentation documents, and they are found to some extent in the letters of agreement that the CSSS participants must sign. Table 3 presents the essential conditions of the Health Promotion Laboratory.

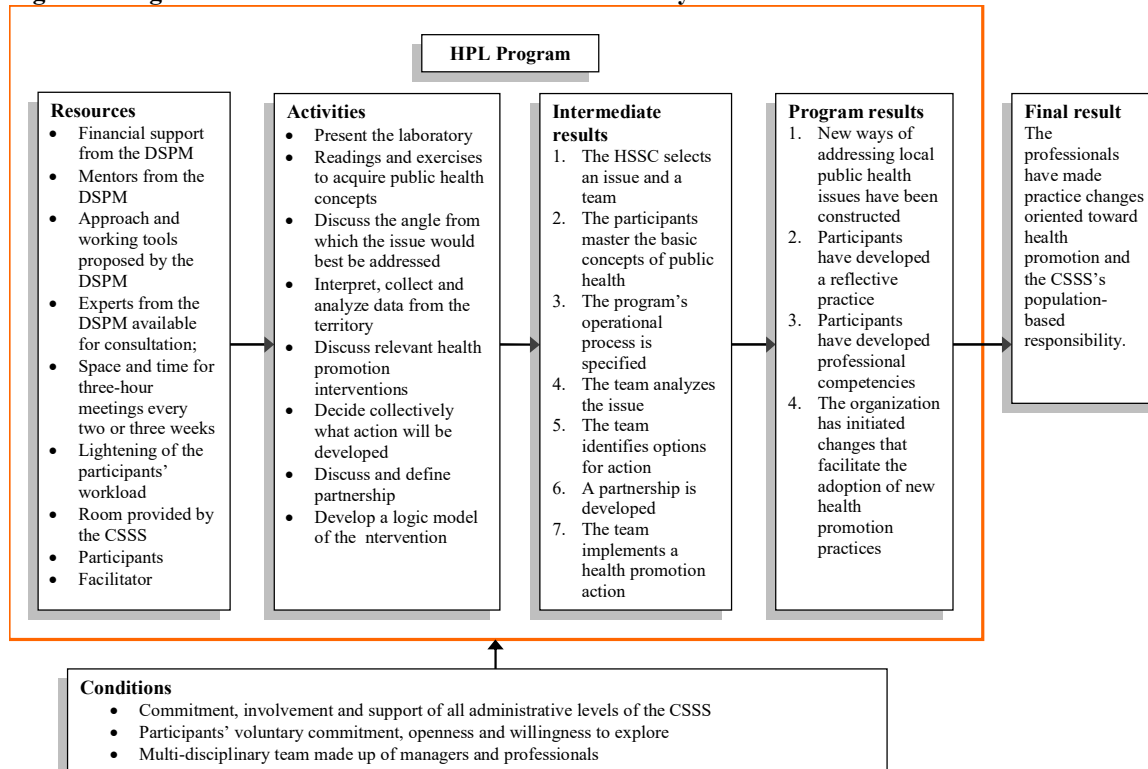**Table 3. Essential conditions expected of CSSSs and participants**

Conditions and level	Description
C1 CSSS	Commitment, leadership and involvement of the local public health director, the program director, and other decisional levels at the CSSS are essential to achieve change. To this end, the executive director of the CSSS should carry out a support visit on a regular basis.
C2 Participants	For participants, voluntary involvement, an open mind, and a desire to explore one's practices are essential characteristics to achieve successful change.
C3 Participants	The laboratory team should be multidisciplinary and made up of both professionals and managers.

As mentioned earlier, the first step of logic analysis is to construct the logic model for the program. A logic model "presents the link between the resources, activities and objectives of production that have been set up for action" (F. Champagne et al., 2009) (p.107). In this case, the evaluator constructed it based on information drawn from the documentation and from observations of the laboratory in action (Figure 1). The

intermediate objectives were related to the different phases of the operational process, and the program's specific objectives were reformulated as results.

Figure 1. Logic model for the Health Promotion Laboratory

HPL Program				
Resources	**Activities**	**Intermediate results**	**Program results**	**Final result**
• Financial support from the DSPM • Mentors from the DSPM • Approach and working tools proposed by the DSPM • Experts from the DSPM available for consultation; • Space and time for three-hour meetings every two or three weeks • Lightening of the participants' workload • Room provided by the CSSS • Participants • Facilitator	• Present the laboratory • Readings and exercises to acquire public health concepts • Discuss the angle from which the issue would best be addressed • Interpret, collect and analyze data from the territory • Discuss relevant health promotion interventions • Decide collectively what action will be developed • Discuss and define partnership • Develop a logic model of the ntervention	1. The HSSC selects an issue and a team 2. The participants master the basic concepts of public health 3. The program's operational process is specified 4. The team analyzes the issue 5. The team identifies options for action 6. A partnership is developed 7. The team implements a health promotion action	1. New ways of addressing local public health issues have been constructed 2. Participants have developed a reflective practice 3. Participants have developed professional competencies 4. The organization has initiated changes that facilitate the adoption of new health promotion practices	The professionals have made practice changes oriented toward health promotion and the CSSS's population-based responsibility.

Conditions
- Commitment, involvement and support of all administrative levels of the CSSS
- Participants' voluntary commitment, openness and willingness to explore
- Multi-disciplinary team made up of managers and professionals

3.2 Development of the integrative framework

The second step in logic analysis consists of developing a multidisciplinary integrative framework based on the scientific literature, within which the program's logic model will be examined. The guiding question for the literature review was: *What principles or characteristics should a professional development program adopt to promote (1) the development of professional competencies, (2) reflective practice, and (3) organizational change?* The question encompasses three of the four specific objectives targeted by the intervention. The first objective, which was *to co-construct new ways of addressing local public health issues*, was excluded for the sake of brevity and because it was aimed at

another level of change, which was to form closer working relationships between regional and local public health structures. Also, it should be noted that these objectives were neither very specific (e.g. broaden professional competencies, initiate organizational changes to facilitate the adoption of new practices) nor mutually exclusive.

As part of this review, we examined the literature on competencies development and adult learning, reflective practice and organizational change. To identify relevant references, we used primarily the ISI Web of Knowledge database. The following key words were used in various combinations: health professional; professional development; competencies development; adult learning; reflection; reflectivity; reflective practice; reflective learning; organization* change; organization* innovation; organization* capacity; intervention; program. An initial review of the titles and abstracts of the articles found with these keywords helped to identify relevant references. Other references were identified from the bibliographies of the relevant articles. Bibliographic works were also consulted.

3.2.1. Broadening professional competencies

Generally speaking, professional development is considered to be a conscious effort to improve practices, which should be based on regular learning episodes anchored in everyday practice to encourage the acquisition of integrated knowledge (Guskey, 2000). Theories of adult learning and of competencies development can provide helpful guidance for the creation of professional development programs (Bryan, Kreuter, & Brownson, 2009; Koo & Miner, 2010; Miner, Childers, Alperin, Cioffi, & Hunt, 2005).

This literature is replete with models and theories that define and explore the characteristics of the learner, as well as the stages and parameters of the learning process. For example, Knowles' andragogy, recognized as one of the most important theories in the adult learning field, is focused on the learner's characteristics. Other models such as Mezirow's transformative learning model are more focused on the different levels of learning. Moreover, some professional development programs focus more on curricula for specific competencies, which are used to develop, implement and evaluate training (Miner et al., 2005). In public health, the core competencies model of the Public Health Agency of Canada, established in 2007, is an illustrative example of this type of model (PHAC, 2007).

Despite this profusion of models and theories, some common principles can be found in the literature on adult learning and competencies development (Bryan et al., 2009; Lawler, 2003). These principles help in identifying the basic characteristics that professional development programs should include (Bryan et al., 2009; Lafortune, 2008; Lawler, 2003). First, learners need to know the reason for training and the learning objectives (Bryan et al., 2009; Caffarella, 2002; M. S. Knowles, 1980; Koo & Miner, 2010). In fact, adults learn better when the educational benefits are clear and meaningful to them (Bryan et al., 2009; Koo & Miner, 2010). Second, learners are motivated by the need to resolve practical problems (Bryan et al., 2009; Lawler, 2003). Therefore, professional development programs need to be anchored in practice and must address problems that the participants would like to resolve (Bryan et al., 2009). Third, the professionals' experience must be respected and mobilized by the training (Bryan et al.,

2009; M. S. Knowles, 1980). In professional development programs, new learning needs to capitalize on participants' existing knowledge, and tangible links must be created with prior knowledge and professional practice (Bryan et al., 2009; Merriam & Caffarella, 1999). Fourth, learners need a variety of educational approaches that recognize the diversity of their backgrounds (Bryan et al., 2009; M. S. Knowles, Holton, & Swanson, 1998). Indeed, learners bring their own experiences and level of competency, which influence their interactions with the instructor, the other learners, and the material itself (Koo & Miner, 2010). As such, different methods must be used and several perspectives represented, and knowledge needs to be contextualized in a variety of ways. Finally, the learner must be actively engaged in the learning process, by sharing control over the program's content and methods, for example (Bryan et al., 2009). The learner's engagement in the process is predictive of the success of the training (Koo & Miner, 2010).

3.2.2 Developing a reflective practice

While there is no single agreed-upon definition, reflectivity is generally conceived as an approach for questioning professional practice (Issitt, 2003). Because reflectivity is an important topic in education and in continuing education of professionals from many disciplines, the literature devoted to it is spread across several fields such as education, nursing and psychology (Mann, Gordon, & MacLeod, 2009). Indeed, "reflective learning is of particular relevance to the education of professionals, as it encourages students to integrate theory with practice, appreciate the world on their own behalf, and turn every

experience into a new potential learning experience" (Wong, Kember, Chung, & Yan, 1995) (p. 48).

Several models and theories have endeavoured to define and conceptualize reflectivity. According to Maan et al. (2009), these can be organized around two dimensions: (1) an *iterative* dimension, relating to the *process* of reflectivity activated by experience and leading to new understanding and ultimately to new behaviours, etc.; and (2) a *vertical* dimension, relating to different *levels* of reflection on experience. Among the models that conceive reflectivity as an iterative process, Schön's reflective practitioner model (Schön, 1984, 1987) is one of the most well-known. Other models, such as Mezirow's transformative learning model, focus on different levels of reflection (vertical dimension).

It is important to note that, despite the abundance of models and definitions, few articles and publications have focused on measuring reflectivity and on how it can be developed and encouraged (Kember et al., 1999; Mann et al., 2009; Wong et al., 1995). Certain parameters of learning can nevertheless be pinpointed as elements that facilitate development of a reflective practice. First, it appears that several strategies, such as keeping a journal, preparing portfolios, brainstorming and dialoguing, can be used to promote the reflective process (Beecher, Lindemann, Morzinski, & Simpson, 1997; Mann et al., 2009; Sobral, 2001; Williams & Wessel, 2004; Wong et al., 1995). A work environment where reflectivity is reinforced and supervised would appear to be another facilitating element (Mann et al., 2009; Mantzoukas & Jasper, 2004). Allocating space

and time specifically for this type of activity is also recommended (Wong et al., 1995). Conversely, working under pressure and in a stressful environment can impede reflectivity (Mamede & Schmidt, 2005; Mann et al., 2009). In addition, a mentoring relationship, which can take a variety of forms, is probably a key element to stimulate and guide reflection (Gustafsson & Fagerberg, 2004; Mann et al., 2009; Teekman, 2000). Likewise, regular support from a small group of professionals (6 to 10 persons) could also act as a facilitating factor (Platzer, Blake, & Ashford, 2000; Westbrook & Schultz, 2000). Indeed, in a group context, the development of reflectivity appears to be encouraged by the members' mutual support and the opportunity to learn from each other's experiences, especially in a multidisciplinary environment (Platzer et al., 2000; Westbrook & Schultz, 2000).

3.2.3 Initiating organizational changes

Organizational change can be broadly defined as any modification to the composition, structure or behaviour of an organization (Bowditch & Buono, 2001; Weiner, Amick, & Lee, 2008). There is a wealth of literature on organizational change, but it is mostly inconsistent, with a proliferation of terms, theoretical frameworks and measurement methods (Weiner et al., 2008). This literature follows the broad lines of several disciplines: sociology, organizational and management sciences, as well as medical and health sciences, in particular (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Nicolini, Powell, P., & Martinez-Solano, 2008). It is also fragmented around conceptual axes that are more specific to particular components or concepts of change, such as organizational innovation, organizational learning, organizational capacity,

organizational management of information, etc. (Greenhalgh et al., 2004; Nicolini et al., 2008; Weiner et al., 2008). In the present case, we focused specifically on the deliberate adoption by an organization of new ways of operating or new practices. As such, our preferred term to refer to change in healthcare organizations is *organizational innovation*, conceived as "a novel set of behaviors, routines, and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness, or users' experience and that are implemented by planned and coordinated actions" (Greenhalgh et al., 2004) (p. 582).

Organizational and management sciences look at innovation from several angles: structural, process-based, contextual, informational, etc. (F. Champagne, 2002; Greenhalgh et al., 2004). All these models have different conceptions of organizational change, of the process underlying the adoption of an innovation, and of the factors facilitating that process.

Based on these different types of models, several kinds of factors can be identified that could influence an organization's adoption of an innovation. However, it remains difficult to define what ideal characteristics a professional development program should assume to achieve the changes it is promoting, since these characteristics are largely dependent on those of the organizational context and on which theoretical lens is adopted. Even though some of the models are contradictory and incompatible, certain common factors can nevertheless be observed.[2] Thus, the relative benefit of the proposed

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[2] These factors do not represent an inventory of all those identified in the literature, but rather are those we considered most relevant with regard to the objectives of this logic analysis.

innovation or change should be clear and without ambiguity (Greenhalgh et al., 2004; Marshall, 1990). Indeed, if the proposed new ways of functioning or new practices are not seen as offering more benefits than the previous ones, they will almost certainly not be considered. The relative advantage of the innovation must be discussed and negotiated, and its benefits must be made visible (Denis, Hebert, Langley, Lozeau, & Trottier, 2002; Ferlie, Gabbay, Fitzgerald, Locock, & Dopson, 2001). As well, the innovation must be compatible with the organization's values, norms and needs (Denis et al., 2002; Ferlie et al., 2001; Greenhalgh et al., 2004). Furthermore, the proposed change must be perceived as simple by those adopting it (Denis et al., 2002; Greenhalgh et al., 2004). To this end, demonstrations and practical experience may be used to reduce the perceived complexity of the innovation, and efforts can be made to minimize organizational obstacles (Rogers, 1995). In addition, if potential adopters are able to adapt, refine and modify the innovation to suit their needs, the chances of its being adopted are increased (Greenhalgh et al., 2004; Rogers, 1995). Also, if the proposed change responds to a need identified by the adopter, the likelihood of adoption is greater (Ferlie et al., 2001; Rogers, 1995). Finally, the fact that the proposed change will improve job performance in the adopters' workplace is another factor that greatly facilitates its adoption (Greenhalgh et al., 2004; Yetton, Sharma, & Southon, 1999).

Furthermore, some determinants can be identified that are related more specifically to the innovation's dissemination across the organization. For example, the probability of a change being adopted is higher if key individuals (champions) in the organization are mobilized to support and disseminate it (Backer & Rogers, 1998; Markham, 1998). More

formal innovation-dissemination programs (e.g. a communications plan) in an organization can be useful if they take into account the potential adopters' needs and views, adapt messages and communication strategies to the organization's different subgroups, use appropriate channels of dissemination, and incorporate rigorous evaluation measures (Greenhalgh et al., 2004; Rogers, 1995). Also, communities of practice have been identified as a social mechanism that can facilitate information dissemination in an organization (Nicolini et al., 2008). Thus, information dissemination depends largely on professional networks, which can be used to transmit new information and new ways of working across the organization's more formal boundaries (Donaldson, Lank, & Maher, 2005; Lathlean & Le May, 2002).

3.2.4 Integrative framework

From the literature review, we were able to develop a picture of the basic principles the professional development program should adopt and the contextual conditions needed to reach its objectives. The development of an integrative framework, which is the necessary second phase of the logic analysis, is presented here as a synthesis of knowledge that is meaningful for the evaluation (Table 4). The framework includes recommendations related to the resources, conditions and activities of professional development programs.

Table 4. Integrative framework

Developing professional competencies	Developing a reflective practice	Initiating organizational changes
• Clarify the reasons for the training and the learning objectives,	• Use methods such as writing a journal, preparing portfolios,	• Promote new practices by presenting their relative

relate them to the motivations of the professionals; • Anchor the learning in practice and promote the relevance of the new knowledge to their work; • Construct links with participants' prior knowledge and experience; • Use a variety of educational approaches (several methods, perspectives, contextualization); • Involve learners in their learning, for instance, by promoting their involvement in defining the program's content and methods, etc.	brainstorming and dialoguing, which promote the development of reflectivity; • Allocate a specific space and time for reflection; • Establish mentoring relationships to encourage and guide the reflective process; • Use a support group to develop reflectivity.	advantages over the previous practices and make their potential benefits clear; • Present the proposed new practices as being compatible with and responding to the needs of both the organization and the adopters; • Use demonstrations and practical experience to simplify the conception of the proposed change; • Minimize any potential organizational obstacles; • Make the proposed innovation something that the organization can adapt as needed; • Mobilize key individuals in the organization to support and disseminate the new practices; • Use formal innovation dissemination programs in the organization; • Make use of the informal professional networks in the organization.

3.3 Analysis of the intervention theory

This last phase of the logic analysis consisted of re-reading the program of the Health Promotion Laboratory in light of the previously developed integrative framework. This allowed us to examine the scientific validity of the links between the resources mobilized, the activities, and the desired outcomes of the program.

By comparing the logic model of the program with the integrative framework developed from the literature, we were able to identify the strengths and weaknesses of the Health Promotion Laboratory. First, with regard to broadening professional competencies, it should be noted that laboratories are constructed around the development of an actual

health promotion intervention. This helps very much to anchor participants' learning in their professional practices. The exploration of a real issue for the territory by collecting and analyzing local data, exercises that help to draw the links with practice, and the importance given to the professionals' experiential knowledge—all of these should, in theory, increase the relevance of the learning and facilitate the participants' construction of new knowledge. Also, using a large number of methods and activities could contribute to a successful learning process. Indeed, the potential array of activities includes reading clubs, training workshops on specific themes, data collection in the field, development of data analysis plans and a logic model, meetings with actors in the environment, consultations with experts, and neighbourhood visits. As well, tailoring the operational approach to the needs of the team should help get the group involved and support its commitment to the learning process. It should be noted, however, that this involvement could be greater, for example, if the participants were involved in defining the learning objectives and the program's content and methods, in collaboration with the program's designers at the DSPM.

The reasons, processes and objectives for learning could be made clearer. Indeed, the participants and the organization are not told beforehand what competencies they are aiming to develop, nor what the final outcome of the program, i.e., the health promotion intervention, will look like—among other things, because the intervention is to be developed in the group. Nor are any details provided on the approach that will be used to achieve the desired outcomes, since that approach is intended to be adapted to the needs of the group. While this characteristic of the program is inherent in the flexible and

creative nature of the laboratory, it could impede participants' learning, according to the literature. As such, it would be good to identify a few concrete markers, such as the general competencies that the program was designed to develop. Likewise, the operational process could be made clearer using examples.

Second, with regard to developing a reflective practice, the Health Promotion Laboratory program performs well. Thus, the allocation of a specific space and time for laboratories by the participating organization, the support from the DSPM to stimulate and guide the reflective process, and the group's reflection and dialogue around roles and professional practices are all program characteristics that are likely to encourage reflective practice. The only recommendation at this level might be to increase the methods and modalities for reflection, such as keeping reflective journals, preparing portfolios, etc.

Finally, with respect to organizational changes, the program has several characteristics that would lead us to expect positive outcomes. Thus, the fact that the program is presented as responding to the CSSSs' needs regarding their new population-based responsibility and their new health-promotion (post-reform) mandate is a strength that could encourage the organization's affiliation with the program. The program's potential adaptability to the organization's needs is a distinct advantage. In this respect, not only is the approach adaptable to the team's needs, but also, it is the organization that selects the problem on which it wants to work. Finally, efforts made in the laboratory to reduce obstacles to participation could also be facilitators of organizational change. In fact, Phase 2 of the operational process is supposed to include a discussion of actions to

minimize constraints and optimize incentives to participate in the laboratory. Moreover, the laboratory relies on the participation of the team managers and other local public health directors and, to a more limited extent, of the executive director of the CSSS to facilitate the dissemination of practice changes in the organization. This is a good idea that shows every sign of being successful in facilitating the dissemination of new practices. This dissemination is also promoted by using more or less formalized communication practices in the laboratory's activities, such as developing communication plans that include internal communication components (Phase 7 of the operational process), writing articles for internal newsletters (Phase 3), encouraging discussions about the laboratory in disciplinary team meetings, etc. Finally, the fact that the laboratory takes the form of a community of practice is definitely a quality that could help ensure dissemination across the informal professional networks in the organization. However, there are still certain gaps with respect to the objective of initiating organizational change. The laboratory's complexity and the difficulty of being able to specify from the outset what the outcomes would be for the organization could be obstacles to participation, as well as to the dissemination of changes within the organization. Indeed, because the laboratory program is new and innovative, it is especially difficult to rely on demonstration and practical experience to reduce the perceived complexity of the program and to make its benefits apparent. As well, these benefits—the new health promotion practices—have to be perceived as more advantageous than the previous ones, which is not necessarily easy to achieve, given the long-term and cumulative effects of health promotion programs (Nutbeam, 1999).

All in all, the Health Promotion Laboratories program presents many qualities that should make it possible to achieve the desired results, even if certain improvements could be made.

4. Reflecting on logic analysis: lessons learned

4.1 Requirements and pitfalls of each phase of logic analysis

Each of the three phases of logic analysis has its own requirements and specific challenges. The first phase involves representing the intervention theory through a logic model. This requires classifying a large amount of information and organizing it into a sequence of causes and effects, distinguishing resources from activities and differentiating between what pertains to the program and what pertains to the context. To do this correctly, the evaluator needs sufficient information about the program and a sound definition of the logic model's different components.

Aside from the complexity of the process in itself, this phase also involves depicting a static representation of the program in the logic model, which can be problematic. In fact, because such programs are collective and complex systems of action, they do not take on an objective, pre-defined reality (L. Potvin, Bilodeau, & Gendron, 2008; L. Potvin & McQueen, 2008). They are implemented in contexts from which they draw inspiration to evolve and adapt (Greene, 2012). In addition, according to Potvin and McQueen (2008), "Logic models are blind to social actors who carry action and operate programs" (L. Potvin & McQueen, 2008) (p. 34). Thus, some authors consider that using a logic model—which formalizes a set of linear relationships among resources, activities and

results—to represent a program is both reductionist and biased (Greene, 2012; L. Potvin et al., 2008; L. Potvin & McQueen, 2008). One solution to this dilemma might be to model the symbolic and power relationships in which the actors are engaged through the program, and to develop a representation in collaboration with the actors involved which they would consider accurate (L. Potvin & McQueen, 2008). In the case analyzed here, meetings with the team were used to validate the logic model of the intervention and to promote the understanding and use of the evaluation's results. However, this concern for a more representative logic model should not prevent the evaluator and the team from building a model that is also useful for the logic analysis exercise. As Miller has emphasized, we should "view models and the exercise of their construction as principally about attaining insight in to problems rather than as creating an accurate and complete small scale representation of what is being modeled" (Miller, 2012) (in press).

The second phase of logic analysis consists in developing an integrative framework based on the scientific literature. This step requires a conceptual leap in order to pass from the program's vocabulary to a scientific one. In fact, the evaluator has to be able to think about the results intended by the program in terms of scientific concepts already existing in the literature. In this case, for instance, the objective stated as 'developing professional competencies' had to be translated into the concept and keywords of 'adult learning' and 'professional development' in the literature search. This implies that the evaluator must be knowledgeable about the field or be able to do research to find scientific equivalents.

The literature review needed to build the integrative framework in phase 2 can be particularly time-consuming. However, the evaluator should keep in mind that the integrative framework does not have to be based on a systematic literature review. The relevance of the literature analysis is more important than its completeness. "Citing foundational and recent scientific work… or using evidence-based data such as systematic synthesis" (Brousselle & Champagne, 2011) (p. 71) are some strategies that could be used in this regard. Also, the evaluator's analytical and summarizing capabilities are indispensable to keep the literature review and the integrative framework aligned with the objective of the analysis. A precise and relevant guiding question, like the one used in this example, is always a good starting point. The evaluator does not need to be an expert in each field of literature consulted, but only to understand this kind of scientific writing in order to transfer relevant knowledge.

The third phase of logic analysis consists of taking a new reading of the intervention in light of the integrative framework. This requires skill and experience on the part of the evaluator to compare the program's intervention theory against the scientific evidence, as these are generally not formulated in the same way. Although not done in our case, this step may become a valuable reflection exercise when stakeholders are invited to participate, allowing them to develop competencies in evaluation. In fact, one limitation of logic analysis is that it remains a post-positivist scientific approach that asserts the superiority of scientific data over other types of knowledge for guiding an intervention's design (Brousselle & Champagne, 2011). With greater participation from the actors

involved, other types of knowledge (experiential, professional) could be incorporated to make logic analysis a richer, more participative and relativistic exercise in reflection.

4.2 Advantages and potential of logic analysis

Having looked at the requirements of the three phases of logic analysis as well as their pitfalls, we now turn our attention to the general advantages and potential of adopting such an approach. First, logic analysis can be useful to strengthen and improve programs that do not have a strong theoretical basis. In the case presented here, logic analysis was useful because professional development initiatives in public health have generally not been very much theorized or evaluated (Gotway Crawford et al., 2009; Koo & Miner, 2010; Tilson & Gebbie, 2004). Indeed, several authors have called for incorporating a scientific and systematic perspective into professional development (Gotway Crawford et al., 2009; Koo & Miner, 2010; Tilson & Gebbie, 2004). "Leading practitioners and researchers within the field of public health have long called for strategic public health workforce development and stressed the need for research to provide an evidence base to guide public health workforce programs and policies" (Gotway Crawford et al., 2009) (p. S5). Logic analysis offers a solution to this need, since it favours the development of programs based on scientifically valid intervention theories. In the case presented in this article, logic analysis suggested to the Health Promotion Laboratory developers some ways to improve their program based on a multidisciplinary theoretical foundation. Logic analysis can also be carried out before a program's implementation, so that improvements can be made before efforts and funds are invested in the program.

Overall, logic analysis offers a rigorous and useful evaluation method that does not require much in the way of human or monetary resources, except for time. In fact, logic analysis is not costly, does not require the extensive engagement of a lot of people in the process, or sophisticated measures. It only needs a discerning evaluator with a thorough understanding of the program's intervention theory, which can be built from the program's documents and with the participation of stakeholders, and access to scientific literature to build the integrative framework. In the Health Promotion Laboratory case, logic analysis provided an easy way to test the program's intervention theory and to judge its potential to achieve its targeted results without mobilizing a lot of resources. However, logic analysis can be time-consuming, depending on the evaluator's experience, expertise and background. Nonetheless, it is a detailed, systematic and rigorous method to test a program's intervention theory, which is an advantage over less well-defined evaluation methodologies.

5. Conclusion

Logic analysis is a specific theory-based evaluation method that can be used to test the plausibility of a program's intervention theory in the light of the scientific literature. In the case presented here, logic analysis was used to evaluate the theoretical suitability of a public health professional development program, the Health Promotion Laboratory. Generally speaking, even if certain improvements were suggested, the program's intervention theory that was evaluated appeared to have been well designed overall. Logic analysis has proven to be a useful method for strengthening a program's theoretical basis and evaluating the plausibility of its achieving the intended results. It can be carried

out in a formative context, presents a detailed methodology, and needs only a few resources—all advantages that would certainly encourage its broader adoption. However, its use may be inhibited by certain features such as its reductionist representation of the intervention theory and the post-positivist character of the exercise. Involving stakeholders and incorporating experiential and professional knowledge into the process could help to counteract these challenges.

Theory-based evaluation is a generative movement in the evaluation field (Coryn, Noakes et al. 2012), as demonstrated by the emergence of many new and related approaches such as logic analysis, contribution analysis and realist review. Yet this is still very much a field 'under construction', where approaches have to be tested, questioned and refined through their application in many settings. The testing and critical discussion of logic analysis presented in this article will contribute to advancing this movement.

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