



The Competency-based Approach A Lever for Changing Public Health Practices in Québec

INSTITUT NATIONAL
DE SANTÉ PUBLIQUE
DU QUÉBEC

Québec 

The Competency-based Approach A Lever for Changing Public Health Practices in Québec

Vice-présidence aux affaires scientifiques

February 2011

AUTHOR

Cora Brahimi, Planning and Research Officer
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

IN COLLABORATION WITH

Céline Farley, Scientific Team Leader
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

Pierre Joubert, Consultant
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

AND THE INVALUABLE ASSISTANCE OF

Lyne Jobin
Direction de la planification, de l'évaluation et du développement en santé publique, Ministère de la Santé et des Services sociaux

Micheline Vézina
Direction de la planification, de l'évaluation et du développement en santé publique, Ministère de la Santé et des Services sociaux

UNDER THE COORDINATION OF

Céline Farley, Scientific Team Leader
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

LAYOUT AND PROOFREADING

Marie-Claire Hevor
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

Hélène Fillion
Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec

REVISION

This document has been validated by Professor Pascal Ndinga, an expert in the field of learning and competency assessment (UQAM) – Département éducation et pédagogie. <http://www.dep.uqam.ca/>.

TRANSLATION

The translation of this publication was made possible with funding from the Public Health Agency of Canada.

ACKNOWLEDGEMENT

This document was produced with the financial support of the Direction générale de la santé publique of the Ministère de la Santé et des Services sociaux

This document is available in its entirety in electronic format (PDF) on the Institut national de santé publique du Québec Web site at: <http://www.inspq.qc.ca>.

Reproductions for private study or research purposes are authorized by virtue of Article 29 of the Copyright Act. Any other use must be authorized by the Government of Québec, which holds the exclusive intellectual property rights for this document. Authorization may be obtained by submitting a request to the central clearing house of the Service de la gestion des droits d'auteur of Les Publications du Québec, using the online form at <http://www.droitauteur.gouv.qc.ca/en/autorisation.php> or by sending an e-mail to droit.auteur@cspq.gouv.qc.ca.

Information contained in the document may be cited provided that the source is mentioned.

LEGAL DEPOSIT – 4th QUARTER 2013
BIBLIOTHÈQUE ET ARCHIVES NATIONALES DU QUÉBEC
LIBRARY AND ARCHIVES CANADA
ISBN: 978-2-550-61419-7 (FRENCH PDF)
ISBN: 978-2-550-68619-4 (PDF)

© Gouvernement du Québec (2013)

TABLE OF CONTENTS

LIST OF TABLES	V
LIST OF FIGURES.....	VII
INTRODUCTION.....	1
SECTION I: THEORETICAL FOUNDATIONS	3
1 KEY LEARNING THEORIES	5
1.1 Behaviourism and the objectives-based approach.....	6
1.1.1 Development of behaviourism.....	6
1.1.2 Pedagogical applications of behaviourism	6
1.2 Cognitivism.....	9
1.2.1 Development of cognitivism	9
1.2.2 Pedagogical applications of cognitivism	10
1.3 Constructivism and social constructivism.....	13
1.3.1 Development of constructivism and social constructivism	13
1.3.2 Pedagogical applications of constructivism	14
2 WHY CHANGE THE PARADIGM?	19
2.1 Limitations of behaviourism and drifts of teaching by objectives	19
2.2 Organizational learning: Towards learning organizations	20
3 OVERVIEW OF THE COMPETENCY-BASED APPROACH.....	23
3.1 Concept of competency	23
3.1.1 Professional situation, learning situation and family of situations	24
3.1.2 Internal and external resources.....	24
3.1.3 Complex know-how to act: mobilizing, effectively combining and putting resources into an operating network.....	25
3.1.4 Characteristics of a competency	25
3.2 Required (virtual) and real (actual) competencies.....	26
3.3 Individual and collective competencies	26
3.4 Specific competencies and cross-cutting competencies	28
4 CONCLUSION	31
SECTION II: PRACTICAL APPLICATIONS	33
5 DEVELOPMENT OF A COMPETENCY FRAMEWORK: PROPOSED FRAME OF REFERENCE	35
5.1 Introduction.....	35
5.2 Competency framework development process	35
5.2.1 Step 1: Clarify the framework's purpose.....	36
5.2.2 Step 2: Adopt a definition of competency	37
5.2.3 Step 3: Specify the format of the framework	38
5.2.4 Step 4: Collect the data.....	39
5.2.5 Step 5: Process the data.....	41
5.2.6 Step 6: Validate the framework	41

5.2.7	Step 7: Organize ownership of the framework	42
5.2.8	Step 8: Maintain the system	42
6	THE VARIOUS PEDAGOGICAL STRATEGIES.....	43
7	MAIN E-LEARNING TOOLS.....	53
7.1	Discussion forum.....	53
7.1.1	What is a discussion forum?	53
7.1.2	Impacts on teaching	53
7.1.3	Impacts on learning	54
7.1.4	Drawbacks	54
7.2	Videoconferencing, interactive whiteboard and chatting	54
7.2.1	What is videoconferencing?.....	54
7.2.2	Areas of use	55
7.2.3	Advantages	55
7.2.4	Drawbacks	55
7.3	Instant messaging	55
7.4	Wikis	55
7.4.1	What is a Wiki?.....	55
7.4.2	Areas of use	56
7.4.3	Impacts on learning	56
7.4.4	Drawbacks	57
7.5	Blogs.....	57
7.5.1	What is a blog?.....	57
7.5.2	Areas of use	58
7.5.3	Impacts on teaching and learning	58
7.5.4	Drawbacks	58
7.6	Podcasting	58
7.6.1	What is podcasting?	58
7.6.2	Areas of use	59
7.6.3	Impacts on education	59
7.6.4	Impacts on learning	60
7.6.5	Drawbacks	60
7.7	RSS	60
7.7.1	What is RSS?.....	60
7.7.2	Areas of use	61
7.7.3	Advantages	61
7.7.4	Drawbacks	61
7.8	YouTube	61
7.8.1	What is YouTube?.....	61
7.8.2	Areas of use	62
7.8.3	Impact on teaching and learning.....	62
7.9	E-portfolios.....	62
7.9.1	What is an e-portfolio?.....	62
7.9.2	What are the main impacts on education?	63
7.9.3	What are the main impacts on learning?.....	64

7.9.4	How are e-portfolios assessed?	64
7.9.5	What are the drawbacks?	64
8	CONCLUSION	65
	BIBLIOGRAPHY	67
APPENDIX	SURVEY OF COMPETENCY FRAMEWORKS IN THE FIELD OF PUBLIC HEALTH.....	71

LIST OF TABLES

Table 1	From a teaching perspective to a learning perspective (Henri 2001).....	16
Table 2	Characteristics of a competency designed as complex know-how (Tardif 2006, p. 26)	25
Table 3	Example of results	39
Table 4	The various pedagogical strategies	44
Table 5	Survey of competency frameworks in public health.....	74
Table 6	Public health competency frameworks throughout the world.....	95

LIST OF FIGURES

Figure 1	Evolution of learning theories.....	5
Figure 2	Design of a training system (Brien 1997)	10
Figure 3	Two skills management axes (Le Boterf 2006)	27
Figure 4	U.S. Association of Schools of Public Health's (ASPH) master's degree in public health core competency model	29
Figure 5	Competency framework development process (Jouvenot and Parlier 2005)	36
Figure 6	Various fields where competency frameworks are used	37

INTRODUCTION

When Québec's 2003–2012 National Public Health Program (*Programme national de santé publique* or PNSP) was updated in 2008, a report highlighted the growing complexity of public health action, particularly when the challenges of integrating the practice of public health in the care and services system at the local level were taken into account. Among the factors challenging the competencies of the actors in the field are the exercise of population-based responsibility arising from amendments to the *Act Respecting Health Services and Social Services* in 2003, the deployment of the PNSP at all levels of intervention, and the importance of engaging all actors to promote prevention and take action on the determinants of health.

The report highlighted significant limitations in this regard including the fragmentation of knowledge and practices, provision of variable and uncoordinated training, management methods often unsuitable for promoting networking, under-utilization of recognized innovative approaches and related technologies, etc. In short, there was no systemic vision to guide and oversee the development of competencies needed to change practices to achieve system objectives. These findings prompted the Direction générale de la santé publique (DGSP) of the Ministère de la Santé et des Services sociaux (MSSS) to engage in a planning process in order to establish broad competency development policies and strategies worth promoting, including tagging the national training offer in an integrated and coordinated programming.

In this context, in addition to the work performed at MSSS, the Institut national de santé publique du Québec (INSPQ) was given a dual mandate. The first part was to identify and review the approaches to continuous training that were the most innovative and best adapted to the new realities of public health action. The second part was to propose a frame of reference for developing competency profiles to support the implementation of the PNSP.

Designed to support action, this document contains two sections, each of which refers to both parts of the mandate. There is also additional information that provides examples of competency frameworks developed in various public health practice environments.

Section I begins by examining behaviourism, cognitivism, constructivism and social constructivism as major learning theories that have shaped the world of education and training, while a second part presents arguments in favour of a paradigm shift. It highlights some limitations of the objectives-based approach (knowledge fragmentation and division of structures) and explains why it is appropriate to move towards more innovative training practices and more flexible structures. Finally, the last part provides an overview of the competency-based approach and related key concepts.

Section II proposes a frame of reference for developing a competency framework. This frame is derived from Tardif's definition of competencies (2006). The section is rounded out by a more detailed presentation of the e-learning tools and learning strategies introduced with the learning theories in Section I.

The appendix to this document provides an overview of some public health competency frameworks—primarily those developed in North America, Australia and some European countries—for the purposes of reference or further reflection. This survey also includes various frameworks developed by the Québec public health system.

SECTION I: THEORETICAL FOUNDATIONS

This section contains three parts:

- Part I examines the main learning theories that have shaped the world of education and training in the last century, including behaviourism, cognitivism, constructivism and social constructivism.
- The second part presents arguments for a paradigm shift. It presents some limitations of the objectives-based approach (knowledge fragmentation and division of structures) and explains why it is appropriate to move towards more innovative training practices.
- The third part provides an overview of the competency-based approach and related key concepts.

1 KEY LEARNING THEORIES

In this first part, the key learning theories and their evolution will be presented with a brief history and an overview of their educational applications. The following diagram situates these theories in time and shows that they were applied concomitantly. An empirical view, according to which “learning is simply deposited in receptive learners,” preceded these theories.

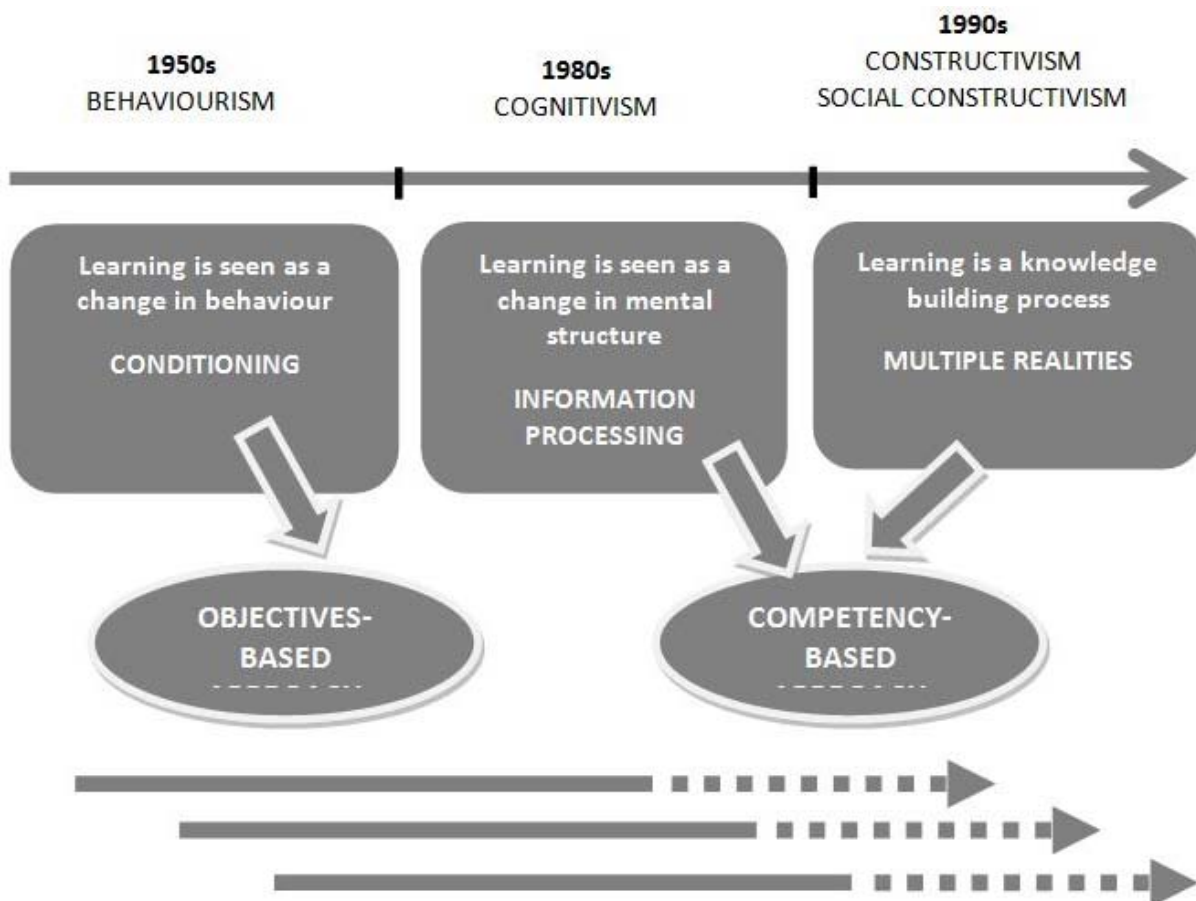


Figure 1 Evolution of learning theories

Behaviourism, cognitivism, constructivism and social constructivism are the major paradigms that have shaped the world of education since the mid-twentieth century. Since a paradigm is a fundamental belief system or worldview (Guilbert 2000), these paradigms are frameworks that standardize knowledge building. They are shared by researchers who work in the same scientific community (Savoie-Zajc and Karsenti 2000). It is important to refer to these paradigms because they underpin learning theories, and learning is viewed differently depending on the paradigm upon which it is based.

1.1 BEHAVIOURISM AND THE OBJECTIVES-BASED APPROACH

1.1.1 Development of behaviourism

Behaviourists define learning as a sustained change in behaviour, which is the set of objectively observable reactions of an organism responding to a stimulus. Objectivism, which states that there is an external, objective reality separate from consciousness, is a fundamental belief of behaviourists. According to behaviourists, individual behaviours are determined by environmental conditions. These conditions shape behaviours, which will be a decisive factor in selecting the pedagogical strategies presented in the following paragraphs.

The S→R (Stimulus→Response) relationship is a very simplified schematization of behaviourism by Pavlov (1848–1936), which is at the origin of the classical conditioning theory also known as the respondent conditioning theory. His dog conditioning experiment is well known. When a dog sees a meatball, it salivates, which is a natural reflex, but if a bell is always rung before the dog is fed, it salivates at the sound of the bell. Pavlov demonstrated the body's plasticity through the relationship of two stimuli—the unconditioned or natural stimulus, and the conditioned stimulus. However, Pavlov's theory, which is widely used in many fields, contains weaknesses such as its inability to explain the emergence of new behaviours. Thorndike (1874–1949) attempted to address this shortcoming with the theory of connectionism, also known as the associative process. His experiments with animals showed that learning occurred through trial and error and was reinforced by repetition and rewards, which he called the law of effect. The experiment with a hungry cat that wanted a piece of fish outside its cage showed that after a series of unsuccessful random attempts, the cat refined its attempts and gradually eliminated the less effective behaviours and escaped from the cage more quickly. The food used to provide satisfaction or a reward after a successful attempt strengthened the connection. Thorndike's experiment showed that rewards can modify behaviour.

Based on this reinforcement and punishment theory, Skinner (1904–1990) developed the operant conditioning theory, which led to programmed instruction. Skinner's programmed learning led to the development of a teaching method that strongly influenced the design of learning systems.

1.1.2 Pedagogical applications of behaviourism

There are numerous applications of this theory in the field of education including programmed instruction, mastery learning and especially the objectives-based approach, also known as teaching by objectives.

Bloom's work, including his renowned taxonomy, spurred on the learning by objectives movement. In 1956, Bloom developed the taxonomy of learning objectives in the cognitive, psychomotor and affective domains, which was widely used in programmed instruction and education technology. In 1962, Mager, another researcher, also shaped the learning by objectives movement by producing a very clear list of learning objectives. According to Mager, a learning objective has to contain an action verb that describes the student's performance objective, a description of the performance conditions and the performance

criteria. Today, Bloom and Mager's learning objectives are still widely used to design training programs, activities and courses.

In general, any training system design or instructional design requires careful planning. This process involves achieving training objectives taking into account several variables: the learner's needs, the context in which learning is to be achieved, the target population, content analysis, the choice of means and media, and finally, the assessment. As shown below, this process varies with the paradigm used. How will a behaviourist approach affect the process? The description below is inspired by the work of Basque (1999) who analyzed the influence of learning theories on instructional design.

- The instructional design process does not take into account the learners' **learning needs**. Learners are not involved in defining their own needs. What matters is the performance targeted by those responsible for the training. The gap between the learners' current performance and the target performance is the training need.
- **Context analysis** (physical, administrative, etc.) is used to control the possible negative effects of conditioning on attitudes and the level of student participation.
- **Task analysis** involves breaking down each task into various levels (sub-tasks, sub-sub-tasks, etc.). The purpose of this exercise is to determine the objectives for each task level, translate them into observable behaviours and assess them. This deconstruction is also used to identify the types of learning and develop the concepts underlying the acquisition of these behaviours. This divides teaching into teaching sequences.
- The instructional designers preselect the **learning objectives**. They very clearly indicate the observable behaviours, i.e. what the learner will be able to do after the course. Generally, objectives are formulated based on the formulation criteria developed by Mager (1962) requiring that a learning objective contain an action verb describing the student's performance objective, a description of the performance conditions and a performance criterion.
- The educators rank the objectives from the simplest to the most complex. They develop a **learning plan** with as many objectives as behaviours to be acquired.
- Learning **assessments** focus on observable behaviours. Assessments can be formative, summative or criterion-referenced. In this case, a criterion-referenced assessment compares the learner's performance to the level of objective acquisition. Multiple choice objective exams are used most often.
- **Pedagogical strategies** encourage students to perform the target behaviour with as few errors as possible. These strategies focus on content presentation, repetitive exercises and systematic reviews.
- **Media** are considered to be auditory, visual, tactile and other stimuli used to achieve the desired behaviour (Marquis and Sauvé 1995). Behaviourists prefer audiovisual media (slideshows, radio, television, film and teaching devices) that can present content or demonstrations.

What are the latest developments in the pedagogical applications of behaviourism? Note that behaviourism is still used and often applied in situations like developing new software or using a work tool. Several professional development activities, such as seminars and symposiums are often developed based on the behavioural model.

Behaviourism states that learning is a response to **external stimuli**.

Learners are plastic, passive and shaped by their environment. Behaviour is acquired through **conditioning** and **repetition**. This behaviour is **objectively observable**.

Behaviourism led to **teaching by objectives** (TBO), task analysis, content analysis, assessment and instructional design.

The teaching objective describes the learner's final behaviour, specifying the conditions under which the behaviour should occur, and defines acceptable performance criteria.

The TBO approach is still commonly used in the world of education and in all areas of training, such as training sessions and programs.

1.2 COGNITIVISM

1.2.1 Development of cognitivism

The discoveries made in the cognitive sciences over the last three decades provide valuable information on how humans process information from the environment (Bissonnette, Gauthier and Richard 2005). Cognitive science focuses on mental processes such as reasoning, memory, problem solving and knowledge transfer. Cognitivists consider motivation a very important aspect of the learning process.

In 1979 at the University of California, San Diego, researchers from various fields (cognitive psychology, artificial intelligence, linguistics and philosophy) gathered to inaugurate a new science, “cognitive science,” with the stated goal of understanding intelligent behaviour (Brien 1997). As early as 1956, researchers from several disciplines had begun questioning behaviourist theories, which ignored human consciousness and whose influence had been dominant in the United States since the turn of the century. These researchers first studied the physical components of human memory and how the human brain stores, represents and illustrates information. The central idea, which led to **the theory of information processing** and would later guide their research, was that the brain stores information in its memory, processes the information and solves problems. Research shows that we have three types of memory: **sensory memory** or the sensory register; **short-term memory** (STM) or working memory, which refers to a set of processes that actively hold information in the mind, which is needed to perform routine cognitive activities (Fortin and Rousseau 1989); and **long-term memory** (LTM), where cognitive units are stored permanently.

In 1976, cognitivist Robert Gagné developed an information processing flowchart. He explained how the short-term memory processes information (stimulus) that comes from the environment in various forms (visual, auditory, olfactory, tactile, etc.). The senses capture the information, which is sent to the sensory memory where it is decoded. Once the short-term memory receives the information, it must be analyzed and interpreted by the individual, which involves reactivating the knowledge stored in the long-term memory. This interpretive activity produces a symbolic construct in the form of schemas or representations that may be concepts, proposals or procedures, which according to Brien (1997) are generic memory structures which permit human beings to represent reality and act upon it. The concept of schemas was introduced by British researcher Frederic Charles Bartlett (1886-1969) who demonstrated that subjects who read short fables used their prior general knowledge to reconstruct the information. When the subjects relate the same stories, they include various distortions that reflect their frame of reference.

Cognitivists view learning as a change in individuals' mental structures or internal representations. It involves active information processing and problem solving. According to Basque (1999) and Brien (1997), the vision of education arising from this paradigm prioritizes learners' active engagement in learning so that they can process information in depth. From this standpoint, creating favourable, motivating learning situations involves:

- Taking individual differences into account because every individual processes information based on his own representation;

- Promoting activities that require long-term memory;
- Implementing strategies that involve problem solving and develop the learners' metacognitive processes.¹

1.2.2 Pedagogical applications of cognitivism

In the mid-1970s, Robert Gagné was the first to apply cognitive science in education in Québec. He developed a model describing how the human mind processes information in learning situations and memorizes it. In the 1980s, work began on developing training system models (instructional design) influenced by cognitivism. For example, in Québec, Brien (1997) recommended a design model—a process going from needs analysis to implementation, including defining objectives or competencies, structuring content, choosing teaching methods, and system testing. With minor variations, this model forms the basis of design models inspired by cognitivism.

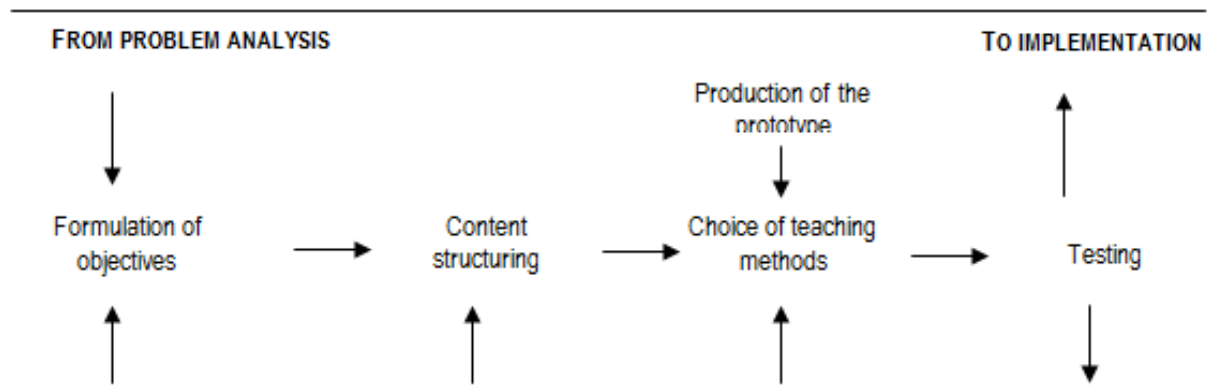


Figure 2 Design of a training system (Brien 1997)

How is each step of this process performed?

- **Problem analysis**

According to Lapointe (1992), when a problem arises in an organization, we need to understand what the problem is in order to respond appropriately. If training is at issue, the first step is to assess the training needs. From a cognitivist standpoint, a training needs assessment involves measuring the gap between the current situation and the desired situation (for the learner) to determine the competencies that a given clientele should develop. Unlike with behaviourism, needs assessment is carried out in the field with those concerned. The needs identified are used to develop courses that meet client expectations. To learn more about needs assessments, consult the needs assessments framework developed by the Institut national de santé publique du Québec (INSPQ), which is available online (see bibliography).

¹ Metacognition is a process of introspection and control. **Introspective** skills involve an inner dialogue (asking oneself questions and answering them) to objectify one's metacognitive experiences. **Self-control** skills involve consciously and deliberately intervening in one's cognitive processes to deactivate unfavourable behaviours and reinforce success strategies (Dictionnaire de l'éducation, Legendre 2005).

- **Customer analysis**

According to cognitivists, all students are different and they all process information differently. Based on this assumption, cognitivists take individual differences into account in training system design. They focus on students' different learning styles, mental models (which are frames of reference and worldviews), motivation, expectations and prior knowledge. Edward B. Titchener (1867–1927) worked on the role of prior knowledge. He used the introspective method to analyze the adult mind. Basque (1999) also explained that from a cognitivist perspective, a continuous analysis of learners' representations takes place in the course of learning, since they are always evolving throughout the learning process.

- **Formulation of learning objectives**

According to Brien (1997), the person responsible for developing training activities must clearly describe the competencies that the learners are to develop. Then in collaboration with the content specialist, he must define the objectives of the activity in question. The objectives are actually global objectives. They are not as detailed as those described in the teaching by objectives approach. They are often objectives that focus on understanding, problem solving and metacognitive skills.

- **Task analysis and content structuring**

According to Brien (1997), task analysis is used to identify declarative knowledge² and procedural knowledge³ needed to develop targeted competencies in a given course and link these types of knowledge to facilitate their acquisition. To achieve this objective, cognitivists do not break the task down into sub-tasks, which is a behaviourist procedure. Instead, they build learning networks by imagining relationships that may exist between different types of knowledge. The terminology relating to this concept is not standardized. It primarily includes conceptual networks (Brien 1997), knowledge graphs (Paquette 2002) and concept maps (Tardif 2006). Contents are structured based on these conceptual networks.

- **Choice of teaching methods or strategies**

Cognitivists generally describe learning as a three-phase process: 1) the acquisition phase, which involves understanding the learning objective by constructing a representation in the working memory; 2) the retention phase, which involves creating a memory trace of the learning in the long-term memory by objectifying, consolidating and reinvesting the knowledge; and finally, 3) the knowledge transfer phase.

According to Bissonnette and Richard (2005), each of these three phases of the learning process should reflect different pedagogical interventions, which educators can use to help learners understand, retain and transfer knowledge. However, we must keep in mind that all the strategies that are planned or that emerge during the learning process aim to encourage learners to actively engage in information processing. Also, training systems are no longer

² **Declarative knowledge** is the type of knowledge that enables people to represent objects and events. Concepts, propositions, sets of interrelated propositions, images and metacognitive knowledge are declarative knowledge.

³ **Procedural knowledge** is the type of knowledge that enables people to act on reality through operators or operations. Action rules, procedures, and cognitive and metacognitive processes and strategies constitute procedural knowledge.

really considered teaching systems. They are now largely viewed as learning systems that encourage learners to process information actively and meaningfully.

- **Mediatization**

Cognitivists view the media as learners' intellectual partners in that they do some of the information processing. In general, cognitivists advocate interactive media that drive learners to understand, perform research and solve problems. The use of multimedia, hypermedia and intelligent tutoring systems is therefore promoted.

Cognitivists also encourage the creation of adaptive learning environments in which individual differences can be mined. An adaptive learning system must be designed to gather relevant information on the individual learner's progress (Depover 1987, cited in Giardina 1999). The authors state that using various types of representation (textual, visual, auditory, kinesthetic, etc.) makes it possible to look into the various learning styles.

- **Learning assessment**

Cognitivists advocate formative assessments, whose purpose is to diagnose gaps during learning in order to make the appropriate corrections (Brien 1997). In general, the purpose of an assessment is to make a value judgment on learners' ability to solve problems in complex situations.

In Québec and Canada, cognitivism is often applied to continuous training systems. For example, each step of the process from needs analysis to implementation—as well as development of objectives or competencies, content structuring, the choice of teaching methods and system testing—forms the basis for continuous professional development in the faculties of medicine and the accreditation criteria of the Accreditation Council for Continuing Medical Education and the Collège des médecins du Québec. The establishment of a continuing training system at INSPQ based on cognitivism had a real impact on various components such as training facilities, methods, support for event organizers, training needs assessment, system assessment, communications, and supply and demand management—all to better meet the needs of its clients.

Cognitive science focuses on how individuals learn, i.e., what really happens in learners' minds. Unlike behaviourists, cognitive scientists no longer consider the brain to be a black box. Learning is viewed as a change in the mental structures or internal representations of individuals. It is an active process.

Cognitivists focus on individual differences (learning styles, mental models, prior knowledge and motivation) and therefore promote the development of adaptive learning environments.

The strategies that are implemented involve problem solving, develop learners' metacognitive processes, and actively engage them in information processing.

1.3 CONSTRUCTIVISM AND SOCIAL CONSTRUCTIVISM

1.3.1 Development of constructivism and social constructivism

Constructivists define learning as an active process of knowledge construction rather than a process of knowledge accumulation and acquisition. Learners are proactive beings who construct their own knowledge and interact with their environment. They construct their knowledge through their own experiences. Knowledge is therefore seen as the result of the activities of active beings.

Knowledge is not passively received either through the senses or by way of communication, but is actively built up by the cognising subject (Von Glasersfeld, 1995).

According to constructivists, there is no single “worldview” because all individuals interpret reality based on their own knowledge, experience and competencies and according to their frame of reference. According to constructivists, there are multiple realities.

Piaget (1896–1980) and Vygotsky (1896–1934) are recognized, respectively, as the main pioneers of constructivism and social constructivism. Both are critics of behaviourism and the reductionist approach (based on the assumption that any complex system can be explained by reducing it to its simplest elements) who have significantly influenced the field of education and pedagogical research through their diverse research works.

Psychologist Jean Piaget’s child development work gave birth to the **constructivist movement** in psychology and education. The central idea of his view of learning is that learners construct knowledge through their various interactions with their environment. This suggests that knowledge is not innate or transmitted by the environment. Knowledge results from learners’ continuous adaptation to the reality to be learned. According to Piaget (1968), intellectual adaptation is a state of equilibrium between assimilation and accommodation. When faced with a new problem, learners will try to solve it using the intellectual tools they possess—this is assimilation. If unable to solve it using this strategy, they modify their intellectual activity—this is accommodation. In short, this means that when a problem creates an imbalance, learners try to reduce this imbalance. They construct more suitable structures and create the conditions for their own cognitive progress. According to Piaget, learning is therefore the result of a dynamic process in which learners seek a balance between themselves and their environment.

Vygotsky’s work led him to consider another element that would prove essential to his thesis: the historical and cultural context and the role of social mediation in learning—called **social constructivism**. According to this researcher, consciousness and thought are not strictly internal characteristics since they develop from external activities performed in a specific social environment. He emphasizes the importance of interacting with others to become aware of one’s own actions and thought process, as well as the essential role of culture in thought formation. According to Legendre (2005), it is precisely this awareness that determines how we act, i.e. our ability to take initiative and successfully perform certain activities.

He states that mediation's role in learning is based on the principle of the zone of proximal development, which he defines as the difference between what learners can do independently or with others' help. According to Vygostky, interventions have to target this development zone to bring learners to the upper limit of the zone. He proposes mediation or support to bridge this gap.

From this standpoint, learners interacting with an educator or peer are communicating, arguing and thinking about their own learning processes. As discussed below, this paradigm particularly favours teamwork and coaching.

In the following paragraphs, constructivism and social constructivism are used interchangeably since social constructivism is considered an extension of constructivism.

1.3.2 Pedagogical applications of constructivism

According to Legendre (2005), constructivist perspectives have become very popular in the field of education and are frequently referred to as the foundations of various pedagogical movements. The main idea associated with this new vision of teaching and learning is that learners are masters of their learning, constructing their own expertise through contact with the environment and interaction with others. Consequently, educators' role changes radically in that they are no longer the sole knowledge source as in traditional teaching.

In the field, how do the foundations of this theory materialize?

Research conducted by Honebein, Duffy and Fishman (1993) and Wilson (1996) led to the idea of constructivist learning environments. These authors view constructivism as a framework for constructing learning environments based on certain principles of constructivism such as subject-object interaction for the construction of knowledge, the importance of social interaction in this construction, the performance of activities in an authentic context and the acceptance of multiple representations.

- **Learning objectives and competencies**

Constructivists do not recommend defining learning objectives in advance. They are actually determined or negotiated by the learners. According to this view, other objectives may emerge during learning and guide the activities. Formulating these learning objectives develops high-level competencies. The competency-based approach, which will be explained further in the document, is one of the most visible applications of constructivism. Constructivists view competency as the ability to mobilize and organize a set of internal and external resources (Tardif 2006).

- **Pedagogical strategies**

Based on the fundamental principles of constructivism, pedagogical strategies should focus on learning in interaction with individuals (educators, peers, groups of learners or any other resources) and interaction with the learning object (rooted in authentic contexts if possible). Thus, constructivists favour the following strategies, which will be developed in more detail in Section II of the document:

- experiments;
- carrying out projects;
- solving global, significant problems such as problem-based learning (PBL);
- simulations;
- collaborative learning (e.g., communities of practice, learning communities or reciprocal teaching technique);
- cognitive support (e.g., internship);
- coaching and mentoring methods.

According to constructivists, the purpose of pedagogical strategies is to help learners master, manage and control their learning process on their own. From this standpoint, educators are more concerned with the learners' learning. They design learning environments that facilitate learners' full development as shown by Henri (2001) in Table 1.

Table 1 From a teaching perspective to a learning perspective (Henri 2001)

Pedagogical Perspective	Focused on Teaching	Focused on Learning
Educator's concerns	What knowledge should I teach? What vision? What message? How should I organize this knowledge? How should I communicate my vision and make them understand my message?	What are my students' training and learning needs? What competencies do they want to acquire to meet their needs?
Educator's role	Content expert Transmitter of knowledge	Skills development coach
Resources used	The educator and his knowledge Literature on the subject of study The environment as an example	The environment as a problem The environment as source of knowledge
Pedagogical strategies	How should I pass on the knowledge that I possess and have constructed? What logic will I use to present and gradually develop my subject?	How will the students learn? What will they do to learn? What can I do to help them move beyond the first level of learning? How can I encourage them to draw lessons from what they learn about the world?

- **Regarding the media: Creation of virtual communities**

Integrating new information and communication technologies (ICTs) into educational settings alters the way knowledge is accessed and changes learners' relationship with the media. According to Karsenti and Larose (2001), ICTs are tools that support the use of dynamic learning strategies, particularly when a constructivist epistemological stance is advocated. They provide learners with great control over their path and help them gradually construct mental structures that incorporate the knowledge acquired. This construction is facilitated by interactive learning where students interact with the media and interpret the teaching data on their own, while constantly adding new knowledge. Like cognitivists, constructivists advocate the use of hypermedia, multimedia and hypertext, which enable learners to choose their own approach to accessing information.

Constructivists favour computerized learning environments that focus on software tools, the Internet and collaborative tools. These tools, which include discussion forums, wikis, blogs, etc. (discussed in greater detail in Section II of this document) are used to create virtual communities, defined as groups of people who meet in a virtual space for the shared

purpose of exploring a theme, or understanding a problem or a complex issue (Iscol 2004). The literature uses various terms: community of interest, learning community, community of practice and online community. The terms also include knowledge network or communities, which are not necessarily virtual communities. The term “community of practice” comes from the work of Lave and Wenger (1991) who defined it as “a persistent, active social network of individuals who share and develop a knowledge base, set of beliefs, values, a common history and/or a mutual enterprise.”

In a book on developing and facilitating intentional communities of practice, Langelier (2005) recalled the work of Wenger and Snyder (2000) who found that communities of practice can help companies implement their business strategies, create new opportunities, solve problems, promote the spread of best practices and develop people’s professional skills. Other studies made similar findings and measured the positive impacts of communities of practice. Fontaine and Millen (2005) conducted a survey of communities of practice in 10 global organizations to identify the individual, collective and organizational benefits. They measured the impact of participating in communities of practice with respect to how community members managed their time when performing various types of intellectual work. Sixty-five percent of respondents reported that participating in communities of practice increased their skills and expertise, 58% of respondents saw their productivity increase, 70% said that this approach led to greater collaboration and finally 57% of respondents thought that it made operations more efficient and profitable.

Paquet (2004) related the experiment conducted by the virtual community of practice (VCoP) for heart health, which tested a new way of professional collaboration and developed practical knowledge for the promotion of heart health and the prevention and care of heart disease. The six-month experiment involved 33 nurses from Québec, Ontario and New Brunswick. Knowledge Forum (KF), a collaborative software tool, was used to create various virtual discussion rooms to facilitate and support collaboration over the network. The experiment produced many benefits: in addition to collaboratively producing a heart health kit for hospitalized cardiac patients, this community of experts tested a new method of knowledge management and professional collaboration, and also implemented a new content production methodology.

- **Learning assessment**

Constructivists recognize that the field of assessment is under development and not yet stabilized. However, they suggest some assessment strategies that seem relevant in terms of knowledge construction and competency development, which Wiggins (1989) referred to as authentic assessment.

The author recommends assessments in real contexts (e.g., carrying out projects) and suggests focusing on the process rather than the outcome. He proposes using various assessment measures, such as submitting work to an assessment committee (instead of one person), and developing self-assessment and peer review. For example, a portfolio is a tool for monitoring one’s own learning, and self-assessment is increasingly used in a constructivist perspective. Portfolios are discussed in greater detail in Section II of this document.

Constructivists define learning as an **active process of knowledge construction**. Learners construct their own knowledge by interacting with their environment.

The work on child development of psychologist **Jean Piaget** (1896–1980) led to the rise of **constructivism**. For this researcher, knowledge is neither innate nor transmitted by the environment. It is the subject's continuous adaptation to the reality to be known. Intellectual adaptation is a state of equilibrium between **assimilation** and **accommodation**.

Social constructivism, an extension of constructivism, is based on the work of psychologist **Lev Vygotsky** (1896–1934) who developed the socio-historical theory. This approach focuses on the role of **social history** and **social interactions** in the construction of knowledge.

Constructivists favour **contextualized learning** in dynamic environments such as computer-based learning environments in which collaborative tools play a very important role. These tools facilitate the creation of **learning communities**.

2 WHY CHANGE THE PARADIGM?

2.1 LIMITATIONS OF BEHAVIOURISM AND DRIFTS OF TEACHING BY OBJECTIVES

Today, there are numerous criticisms of behaviourism in general and the objectives-based approach in particular and their impact on training programs, the competencies developed by learners and learners' attitude to learning. Although this theory laid the groundwork for many advances in education, it now seems less relevant for developing training systems. The main criticisms raised in the literature are briefly described below.

- The objectives-based approach requires that all learning objectives be described in detail and that each task be associated with an objective. This leads to a **proliferation of educational objectives** that educators find difficult to manage.
- Breaking down knowledge leads to **the fragmentation of knowledge and competencies**. When knowledge is systematically and progressively segmented into smaller units, learners do not have an overview of their training and cannot make connections between the types of knowledge presented. This does not facilitate the integration of knowledge.
- Many authors (e.g., Legendre 2005 and Tardif 2006) highlight significant gaps concerning “high-level” intellectual functions such as problem solving, argumentation, critical analysis, etc. According to them, the objectives-based approach generally focuses **on low-level intellectual competencies** such as memorization, definition and illustration of concepts, application or implementation.
- The objectives-based approach is more focused on the content **and the accumulation of knowledge**. Louis Jutras and Hensler (1996) state that the cognitive aspect (knowledge and know-how) is becoming more important than the emotional aspect (behaviors). Consequently, assessments generally focus on cognitive objectives relating to the discipline. According to Legendre (2001), this knowledge is often inert because learners are unable to make good, sensible use of it in other situations. According to Lebrun (2007), knowledge is inert because it is not contextualized, which makes it difficult to use. Legendre (2001) also states that many studies conducted in schools and various fields of knowledge have highlighted the lack of knowledge re-use and transfer.
- **Assessment at the expense of learning** is another critique cited by many researchers (including Scallon 2005 and Tardif 2006). Because observable manifestation is an essential characteristic of behaviourism, emphasis is placed on partial assessments, which often focus on a very specific type of knowledge. Multiple choice questions, which are widely used, are inefficient for more global assessments.

For several decades, objectives have been used to develop academic programs which promote training focused more on content and learner outcomes. According to Louis Jutras and Hensler (1996), the management structure of training programs, the university credit hours system and the definition of university professors' tasks support this trend. Universities have traditionally segmented content based on professors' field of specialization, which makes it difficult to interface with other disciplines.

Nguyen and Blais (2007) explain that in the 1960s, medical education curricula adapted to the objectives-based approach under the influence of the fields of education and sociology. The obligation to clarify intentions and specify performance outcomes made this approach interesting and its appeal was obvious. Initially there was considerable enthusiasm for this approach, but educators had to deal with the difficulties of implementing it in the field. The authors reviewed note that objectives-based pedagogy sometimes led to the development of lists of excessively detailed objectives exposing learners to the risk of fragmented learning, at the expense of more comprehensive and meaningful representations.

According to Scallon (2004), the purpose of the reforms implemented in Québec and elsewhere in the world was not simply to align the education system with the requirements of the modern world, but also to question the effectiveness of the education system. The author laments graduates' inability to use their knowledge and competencies to solve problems or perform the tasks of daily life.

So in recent years, educational institutions have questioned this behaviourist logic, which in turn puts into question TBO and programs focused on disciplinary content. A movement is underway. The education community and many faculties and professional organizations are turning to the competency-based approach (discussed in greater detail further on), considered a more comprehensive and systemic approach. In Québec, since the 1990s, the Ministère de l'Éducation, du Loisir et du Sport has been implementing the competency-based approach in primary and secondary schools. CEGEPs have also followed suit. However, this change is occurring more slowly in universities. Recent programs, such as the Bachelor of Science in Nursing degree, were developed using a competency-based approach. However, most graduate level community health education programs are still using an objectives-based approach, except for the online public health microprogram of the Université de Montréal or other similar micoprograms.

2.2 ORGANIZATIONAL LEARNING: TOWARDS LEARNING ORGANIZATIONS

The evolution of modern society, the complexity of professional practice, the rise of the knowledge economy, the relentless advance of information and communication technologies (ICTs) are now challenges that all organizations and communities face. Some of these societal changes disrupt existing structures and are not compatible with earlier approaches. They highlight the limitations of both traditional scientific management approaches and behaviourist training approaches. Administrative silos, lack of autonomy, very hierarchical structures and lack of structural flexibility arising from these great theories increasingly hinder organizational improvement. As a result, many companies, academic institutions and communities are trying to change their strategies. They are seeking new forms of organization that will allow them not only to adapt to change and make their structures more flexible, but to have all human resources participate intelligently in developing the organization. Individual performance depends not only on competency, but on other factors related to the environment in which individuals function. As well, acquiring competencies is no longer seen as an individual undertaking, but an organizational initiative that also involves acting on the environment.

Addressing organizational learning assumes that we are attributing cognitive skills to the organization. Even if individuals design their own learning processes, their constructions are rooted in organizational practices (set of practices and the principles that underlie them). This provides the process with its organizational or collective dimension, which extends beyond the basic level of the individual actor (Szylar 2006).

Similarly, Le Boterf (2006) argues that organizations should now focus on developing **collective competencies**, whereas for many years, businesses chiefly focused on developing individual competencies. The author states that the resources of a single individual (knowledge, experience and skills) are insufficient given the complexity of today's world and professional practice. As a result, businesses, academic institutions and communities in general should increasingly opt for environments that facilitate knowledge sharing. Le Boterf notes that many organizations are experimenting with communities of practice supported largely by information and communication technologies (Section II), making use of multidisciplinary and interdisciplinary groups and promoting joint projects and networking. From this standpoint, knowledge is no longer the prerogative of a privileged person or group because everyone is involved in producing and transferring knowledge.

Becoming organic, a company tends to organize itself and function as a competencies network. Its performance will depend on its ability to engage and combine these actors' competency resources. In this intelligence network, every individual's competencies can enhance the network, which every actor can then use. (Le Boterf 2006) [Translation]

The current trend is toward **learning or intelligent organizations**, which Senge (1991) defines as:

Places where people continually expand their capacity to create the desired results, where people's learning is promoted, where collective aspirations are encouraged, and where people are continually learning how to learn together. [Translation]

In his work on what he described as *the fifth discipline*, he explains that individuals and organizations learn little because of their mental models which most often hinder learning. To highlight the role mental models play in our actions, he examines some cultural dysfunctions such as "compartmentalization," which is the tendency to break everything down to find an explanation for a phenomenon. However, this practice limits the understanding of complex phenomena, which cannot be understood based on a systemic vision (Morin 1990). "Competition," another example of cultural dysfunction, involves *looking good rather than being good*. This attitude leaves little room for genuine transparency and exchange. To remedy this situation, Senge proposes five disciplines that provide new ways to lead organizations towards continuous learning:

- **Mental models** are representations or images deeply embedded in our minds that shape our understanding of the world. Because they influence decision-making and action, Senge suggested that we become aware of them and change them so they no longer hinder learning.
- **Personal mastery** involves deepening and clarifying our approach, focusing personal energy and developing adaptive skills such as patience. According to Senge, organizations generally have very little interest in their members' personal development.

- **Building shared vision** inspires a commitment that drives a team to develop itself, share and enhance a common vision of the future and develop practices to achieve it. It helps align activities to achieve a common goal.
- Today, **team learning** is becoming a critical concept because modern organizations now rely on teams, not individuals. Lapointe (2001) states that a team that works together develops an intelligence and practice greater than the sum achieved by its individual members.
- **Systems thinking** or the fifth discipline is a conceptual framework, a body of knowledge and tools developed to understand phenomena as a whole and really help to change them. It is called the fifth discipline because it integrates the other disciplines, which according to Senge, must be developed together.

Senge's work is an extension of research conducted by Argyris and Schön, who became interested in organizational learning in the 1970s, in response to the rigidity of organizations.

According to Argyris and Schön (1978), learning in a learning organization must be a "double-loop" process, which involved questioning the relevance of the rules and standards of operation, strategic choices, and even at times, the values of the institution. This learning makes it possible to modify learning approaches, i.e. "learning to learn." This way of learning is unlike "single-loop" learning, which is based on routines and involves discovering and correcting errors in relation to a set of performance standards. This type of learning cannot change routines and may ultimately cause the organization to become sclerotic.

The current debate involves questioning the fragmentation of knowledge (division into disciplines and subjects) and the limitations of linear thinking based partly on behaviourism.

Participants in recent discussions and research are attempting to understand the complexity of today's world and move towards more systemic thinking, more flexible structures and less hierarchical and linear organizations.

Competency development is no longer chiefly oriented towards the individual. The organization itself must learn and must therefore promote group learning.

Cultural routines and dysfunctions hinder learning. Senge (1991) proposes five disciplines to help organizations move towards a culture of continuous learning:

- Mental models
- Personal mastery
- Building shared vision
- Team learning
- Systems thinking

3 OVERVIEW OF THE COMPETENCY-BASED APPROACH

This third part presents the concept of competency in particular and the competency-based approach in general. It highlights a vision of the concept of competency, which will underpin the proposal for a frame of reference for developing a competency framework in the next section of the document.

3.1 CONCEPT OF COMPETENCY

There are a wide variety of definitions of the concept of competencies in the literature. Lafortune (2008) notes that these definitions usually contain various dimensions and sometimes underpin differing, even opposed, theoretical perspectives. Competency can therefore be defined in several ways, which may make it difficult to understand this complex concept, and which why an informed choice is necessary when considering a shift to **competency-based training**.

According to Le Boterf (2006), the concept of competency has to be consistent with the changing contexts and situations in the workplace. The author states that professionals can no longer be required to implement preconceived plans, given the increasingly complex and unpredictable professional situations they have to deal with. Instead, professionals have to solve complex problems, take initiative and have some room to maneuver autonomously. The author's argument focuses on current trends in work organization where responsibility for managing professional situations takes precedence over completing sub-tasks and procedural tasks.

In this sense, it is essential to choose a definition of competency that reflects changing professional situations and encourages learners to become involved in their own development. The following lines, based on the vision of three authors (Le Boterf, Tardif and Jonnaert), present the essential elements of the concept of competency from a constructivist perspective.

Competency is a person or group of persons' ability to apply knowledge, behaviours or attitudes, know-how or adaptability in a given situation. Competency is always contextualized in a specific situation and always depends on how the person views the situation. (Jonnaert 2009) [Translation]

Competency is **complex knowing how to act** supported by **effectively drawing upon** and **combining** a variety of internal and external resources within a **family of situations**. (Tardif 2006) [Translation]

Competency is based on three key factors: **knowing how to act**, which involves combining and bringing together relevant resources (knowledge, skills and networks); the **willingness to act**, which refers to the subject's personal motivation and engagement; and the **power to act**, which refers to the context, organization of work and social conditions that make it possible and legitimate for an individual to take responsibility and take chances (Le Boterf 2006). [Translation]

The above definitions reveal fundamental aspects of the new vision of the concept of competency. These elements are discussed in further detail below.

3.1.1 Professional situation, learning situation and family of situations

At first glance, it appears that each definition of competency is based on the concepts of situation and context. In this regard, we have already seen that real or actual competency can only be developed in situations and through action. The concept of situation is therefore central to competency development. When performing their work, individuals faced with a situation to be resolved will develop a real competency if they manage to deal with it effectively. Professional situations are situations that people encounter in their work and must manage effectively. Joannert (2009) specifies that the outcomes of this approach must be socially acceptable. According to Le Boterf, professional situations are key activities associated with a set of performance criteria or professional requirements.

It should be noted that for many reasons, learning does not always occur in an authentic context. In this case, the educator or trainer will create learning situations that reflect reality as closely as possible to enable the learner to develop effective competencies.

Tardif's definition indicates that competency is exercised within a family of situations, which other authors such as Jonnaert call a class of situations. A family of situations is a set of similar situations that may belong to the same category because they share certain commonalities. In this sense, each family of situations to be addressed creates one competency.

3.1.2 Internal and external resources

The definitions state that individuals select, draw on and combine a set of resources. They are key to understanding the concept of competency. Tardif divides these resources into two categories: internal resources and external resources.

Internal resources belong to the individual. There are many types of internal resources (cognitive, emotional, etc.), including the individual's knowledge, skills, attitudes, know-how, experience and qualities. In this case, the word resource has a very broad meaning, which encompasses everything an individual can use to develop a competency.

It should be noted that proponents of the objectives-based approach generally use the concepts of knowledge, know-how and behaviours to identify these resources. Cognitive science uses different terminology such as procedural knowledge and declarative knowledge, which we defined in the initial chapters. Other authors also refer to conditional knowledge, which focuses on conditions of action (when and why). Terminology should not be an obstacle for those involved in training design. Everyone should use the terminology they consider most consistent with their educational values. The key is to identify the internal resources to be learned, which learners will eventually have to use to develop the target competency.

External resources are often environmental resources needed to develop the competency (professional networks, documentation networks, databases, reference documents, Internet, software etc.). Le Boterf emphasizes the importance of these resources, which are used extensively in learning.

3.1.3 Complex know-how to act: mobilizing, effectively combining and putting resources into an operating network

As indicated above, competency is a complex set of knowing how to act based on effectively mobilizing and combining a variety of internal and external resources. This conception of competency, which emphasizes **complex knowing how to act**, runs counter to traditional content delivery approaches in which the teacher was the source of knowledge. According to this view, competency is not procedural, but heuristic. Individuals use a number of resources **in action** to manage a situation effectively. Jonnaert explains that beyond drawing on resources, individuals must not only select the resources they believe will be most effective in this situation, they must also coordinate the resources to be used with each other. According to the author, this is about more than a sum of resources; it involves putting the resources that have been selected into **an operating network**. Basically, this concept calls on learners to become actively involved and manage their own learning process.

However, as noted by Le Boterf, competency is also the result of the **power to act**, which means that producing competent action is not only the learner's responsibility, since the work environment (organization, means, working conditions, compensation, etc.) has an impact on the outcome of the activity. In this sense, the learner and the organization share the responsibility.

3.1.4 Characteristics of a competency

Tardif identifies five main characteristics inherent to competency: 1) integrative, 2) combinatorial, 3) developmental, 4) contextual, and 5) evolutionary. Table 2 briefly defines each characteristic.

Table 2 Characteristics of a competency designed as complex know-how (Tardif 2006, p. 26)

CHARACTERISTICS	PERSPECTIVES
Integrative	Each competency requires many different kinds of resources.
Combinatorial	Each competency involves organizing resources in various ways.
Developmental	Each competency develops throughout life. Competency is an ongoing process, so learning to master a given competency can take place over time and become increasingly complex.
Contextual	Each competency is applied in contexts that guide the action. The contextual character introduces the idea of critical situations within a family.
Evolutionary	Each competency is designed to integrate new resources and situations without compromising its nature.

3.2 REQUIRED (VIRTUAL) AND REAL (ACTUAL) COMPETENCIES

The preceding definitions show that a subject develops competency by combining and using a series of resources to manage a given situation. A competency develops within the action and the context. Therefore, the competency that the individual will develop cannot be described in advance. However, training programs generally describe the competencies that the learners are to develop. These competencies described in competency frameworks are not real competencies, they are **required** or **virtual competencies**. According to Jonnaert, competencies should be considered guidelines for organizing training. Similarly, Le Boterf considers that they are targets that will help individuals initiate the competency building process and learn to act competently.

Real or actual competency is the result of a personal engagement to manage a situation successfully and efficiently. Insofar as competencies are built through the individuals' experience, motivation, knowledge and attitude, every real competency is unique. Therefore, it cannot be described before the action. It can be described when the situation has been successfully managed.

This distinction between required and real competencies is important in a constructivist perspective where there are multiple realities, and in which learners are active beings who are masters of their learning. To ensure that learning activities enable learners to develop real competencies through action, competency frameworks should specify the professional situations for which learners are to develop competencies.

3.3 INDIVIDUAL AND COLLECTIVE COMPETENCIES

In the previous chapter, we highlighted communities' interest in creating environments that promote the development of collective competencies. These organizations have become aware of their inability to cope with changes through a singular focus on developing individual competencies. In this regard, Le Boterf (2006) notes that it is increasingly difficult to be competent all by oneself. According to the author, modern organizations are faced with the challenge of developing skills management that can take into account both individual and collective competencies management. To explain his vision, the author creates a schema with two axes (Figure 3): the individual competencies development and management axis, and the competencies cooperation axis.

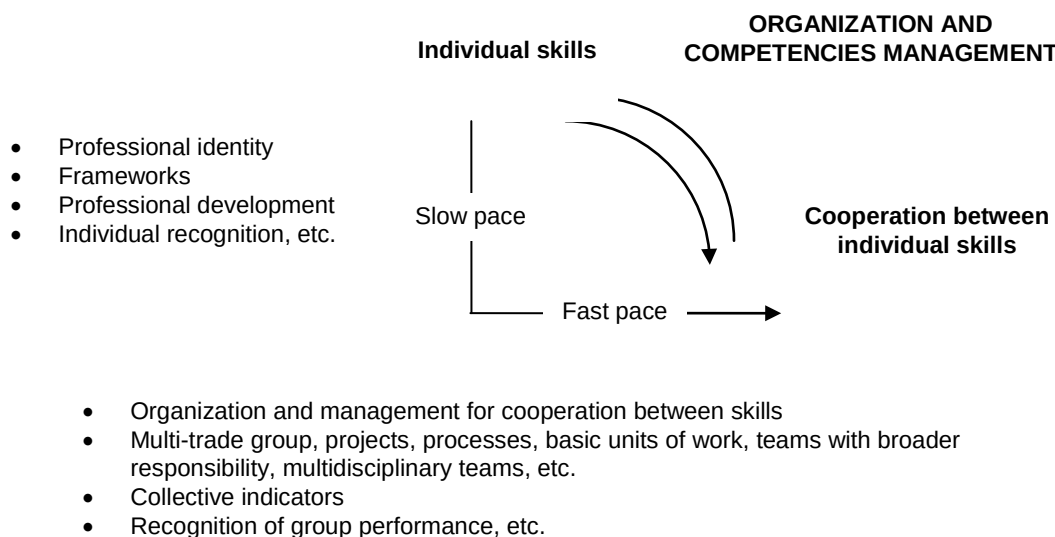


Figure 3 Two skills management axes (Le Boterf 2006)

The individual competencies development axis highlights individuals' personal development and the construction of their professional identity. In this model, which has dominated for decades, individual performance is the reference and competencies are managed relatively slowly. If managing individual skills development is standard practice, but managing collective competencies is a new practice, what is the most practical way to manage these collective competencies?

Collective skills development is driven by an organization and management that promote and facilitate cooperation and synergy among skills. The organization must be flexible, information devices effective and recognition measures collective. Teamwork, loop learning and new information and communication technologies (ICTs) are promoted. Networks and interdisciplinary teams are essential resources.

Harrigan's study, "Quest for Quality in Canadian Health Care" (2000), provides an example in which an interdisciplinary team worked to improve waiting times in the emergency department at St. Joseph's Health Centre in London, Ontario. In addition to reducing wait times, the experiment led to improved communication between patients and staff. The same author tells the story of the Headwaters Health Care Centre in Orangeville, Ontario, which received the 3M Health Care Quality Team Award in 1999. This multidisciplinary team developed collective skills in action in the field and improved the quality of patient care by introducing leading-edge technology.

Despite organizations' growing interest in collective competencies, individual competencies should not be overlooked because they are needed to develop collective competencies.

3.4 SPECIFIC COMPETENCIES AND CROSS-CUTTING COMPETENCIES

The definitions provided by Tardif, Jonnaert and Le Boterf do not mention cross-cutting competency or specific competency. To understand their position on this concept, it is important to first consider what some authors mean by specific competency and cross-cutting competency.

According to Perrenoud (1995), all high-level competencies are “cross-cutting” in the sense that they use knowledge and methods from more than one discipline. This means that a number of competencies are completely independent of specialized knowledge. They differ from disciplinary competencies. For greater clarity, let’s see how the Faculté de médecine of the Université de Montréal (2006) defines these two concepts [Translation]:

A **cross-cutting competency** is intellectual, methodological, personal, social and communication know-how that transcends disciplinary knowledge, while deploying itself and promoting its acquisition and use in specific situations (Université de Montréal 2006).

Specific competencies are competencies that can be used in relatively few situations requiring specific knowledge related to a given professional activity (Université de Montréal 2006).

The following two examples show that those who worked on these frameworks consider cross-cutting competencies to be those common to multiple disciplines.

Example 1 is the graduate-level *Microprogramme en santé publique* for executives and working professionals. This program, which was developed by the Université de Montréal and the Institut national de santé publique du Québec (INSPQ), is composed of three disciplinary competencies and two competencies considered cross-cutting because they are common to multiple disciplines. The competencies are:

- Analyze and assess population data (disciplinary competency)
- Plan programs and interventions for the prevention of health problems and the promotion, protection and assessment of health (disciplinary competency)
- Analyze a public health problem (disciplinary competency)
- Implement action strategies (cross-cutting competency)
- Communicate effectively (cross-cutting competency)

Example 2 involves the U.S. Association of Schools of Public Health’s (ASPH) master’s degree in public health core competency model.

The Association of Schools of Public Health (ASPH) conducted a broad consultation to develop a public health core competency model. More than 400 people helped to implement and validate the model. The tool was based on the five core disciplines of public health: epidemiology, biostatistics, environmental health sciences, health policy and management and social and behavioural sciences. Each of these disciplines has a number of disciplinary competencies. The authors of the model also defined nine competencies common to each discipline, called interdisciplinary/cross-cutting competencies, as shown in Figure 4.

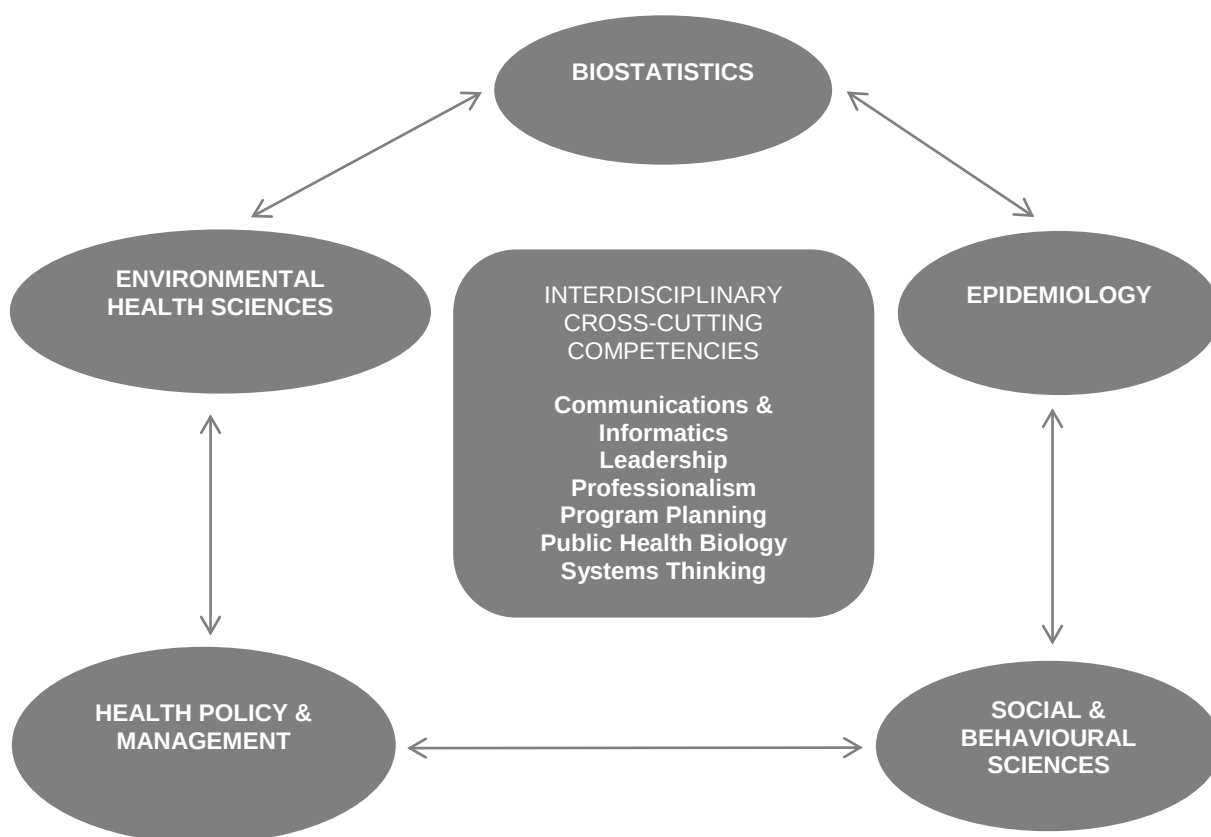


Figure 4 U.S. Association of Schools of Public Health's (ASPH) master's degree in public health core competency model

The previous two examples show that those who worked on these frameworks agree that cross-cutting competencies are those common to multiple disciplines. From our standpoint, given the reference definition, introducing the idea of cross-cutting competency would be inappropriate because every competency is defined based on a family of situations, which means that a competency cannot straddle several families of situations. It is clear that competency development situations, including public health, involve the phenomenon of cross-cutting. The previous models show that communication, leadership, systems thinking, professionalism and the implementation of strategies certainly have an interdisciplinary, and therefore cross-cutting character. However, instead of considering these elements as competencies, the reference definition refers to the idea of resources that can be used in various contexts. From this standpoint, the resources (knowledge, skills, abilities, etc.) themselves are cross-cutting and common to multiple disciplines. It was necessary to examine the world of cross-cutting competencies before proposing a frame of reference, given the numerous current debates and controversies surrounding the concept.

4 CONCLUSION

In conclusion, given the increasing complexity of professional situations, organizational change, and the rise of constructivism and new technologies, the competency-based approach seems appropriate for constantly improving practices in public health organizations that have to meet the challenges of populational responsibility and better integration into a more inclusive care and services system. The competency-based approach can provide a balance between individual and collective skills development in this highly complex environment and contribute not only to the personal development of all public health stakeholders, but also that of the entire organization.

The concept of competency has a wide range of meanings. It can mean different things in different paradigms. The reference definition in this document defines competency as a complex set of know-how in which learners are active people who construct their own knowledge in situations. This **dynamic view of competency**, which is based on cognitivism, constructivism and social constructivism, seems appropriate for developing competencies in the field of public health.

The **required competencies** defined in competency frameworks are never the same as **real competencies**. All individuals develop their competencies in their own way based on their motivations, frame of reference and the resources they bring together in action.

For decades, organizations had chiefly focused on developing **individual competencies**. Today, given the complexity of professional situations and the development of the knowledge economy, there is a move towards developing **collective competencies**. These competencies are developed through environments that **facilitate** information and knowledge sharing, teamwork, interdisciplinarity, networking and the creation of communities of practice (generally supported by new technologies).

SECTION II: PRACTICAL APPLICATIONS

This section contains three parts:

- The first part presents a **frame of reference for developing a competency framework** based on Tardif's definition.
- The second part develops various **pedagogical strategies** introduced in Section I where theories of learning were discussed.
- Part three discusses the **e-learning tools** that were mentioned in various parts of Section I.

5 DEVELOPMENT OF A COMPETENCY FRAMEWORK: PROPOSED FRAME OF REFERENCE

5.1 INTRODUCTION

A competency framework is an essential tool for implementing a competency-based approach. Many companies, organizations and educational institutions therefore recommend competency frameworks in many fields and specialties (Tardif 2006).

Le Boterf states that a competency framework must not be a simple job description, an exhaustive list of all tasks to be performed or a mould that produces stereotyped behaviours. It is actually an evolving, updatable tool that provides many benefits. It provides an overview of professional activities, the conditions and procedures for organizing them and the resources (know-how, qualities, resource networks, etc.) to be brought together to implement these activities. From this standpoint, a competency framework provides a vision of what needs to change in professional practice and consequently shows the changes that the enterprise or institution must implement.

A competency framework is used to develop training plans based on a training needs assessment, which will not be discussed in this document.

In a competency-based approach, a competency framework is also an important tool for human resources. It helps guide human resource management subsystems (recruitment, internal mobility, etc.). A competency framework is also a development instrument for the various actors and provides a systemic vision of the organization and the individual's progress.

This first section provides a frame of reference for developing a competency framework. This tool seems essential in that Québec public health is undergoing significant changes and competency development is a key lever of change. This frame of reference will be used to:

- Guide those involved in developing competency frameworks in priority areas
- Get those involved in training actions to develop courses that meet stakeholder requirements
- Establish performance standards to enhance the organization's performance
- Identify the relationships between the various actors and structures (human resources, training, etc.)

5.2 COMPETENCY FRAMEWORK DEVELOPMENT PROCESS

The proposed approach for guiding public health designers and working groups in developing and assessing competency frameworks is based on the framework development method created by Jouvenot and Parlier (2005). As well, the outline of the framework is strongly influenced by Tardif's view of the concept of competency. His definition was discussed in Section I.

The framework proposed by Jouvenot and Parlier (2005) consists of an eight-step process, as shown in Figure 5. The various steps are not strictly linear; many of them may overlap and loop back and forth, as explained below.

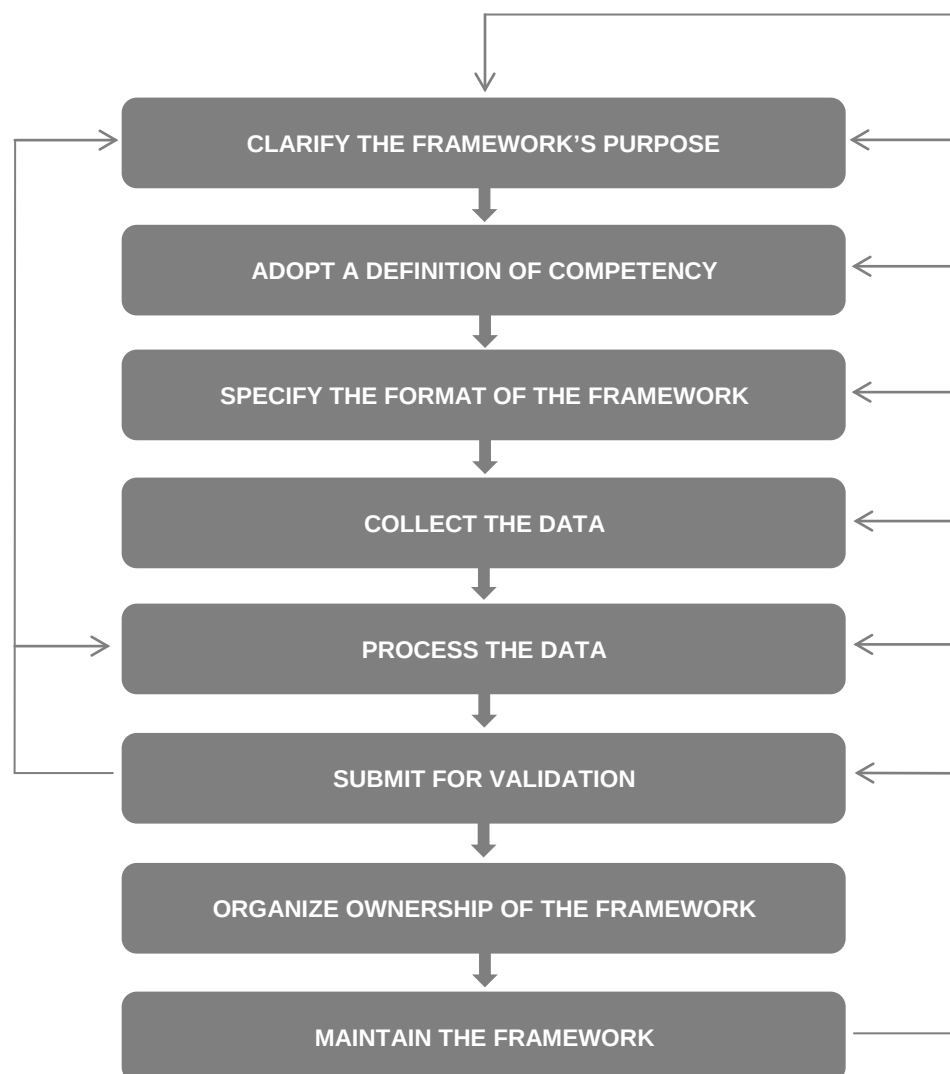


Figure 5 Competency framework development process
(Jouvenot and Parlier 2005)

5.2.1 Step 1: Clarify the framework's purpose

To clarify the purpose of the framework, we need to ask why we should create a framework, what it will be used for and how it will be used in the organization. In short, does the framework make sense and can it be sustained within the organization?

First, the problem must be defined. Does it involve a new field or function? Is there no framework or a lack of information on the area? Is it to be used to develop training plans or career plans? Is it an institutional commitment?

These questions must be asked before the framework is designed. They are usually asked by a group of people who collect relevant information on the situation (literature review, discussions with managers, field staff, etc.) to build a case for the merits of developing a competency framework and how it will be used. We should keep in mind that a competency framework is a useful tool for many of the organization's activities: staffing, classification of personnel, competency assessment, career management, knowledge management and training plans as shown in Figure 6.

This first step in the development of the framework is crucial. It enables decision-makers to understand the need for developing a framework; if applicable, allocate a budget for its design; and start the process with clear objectives.

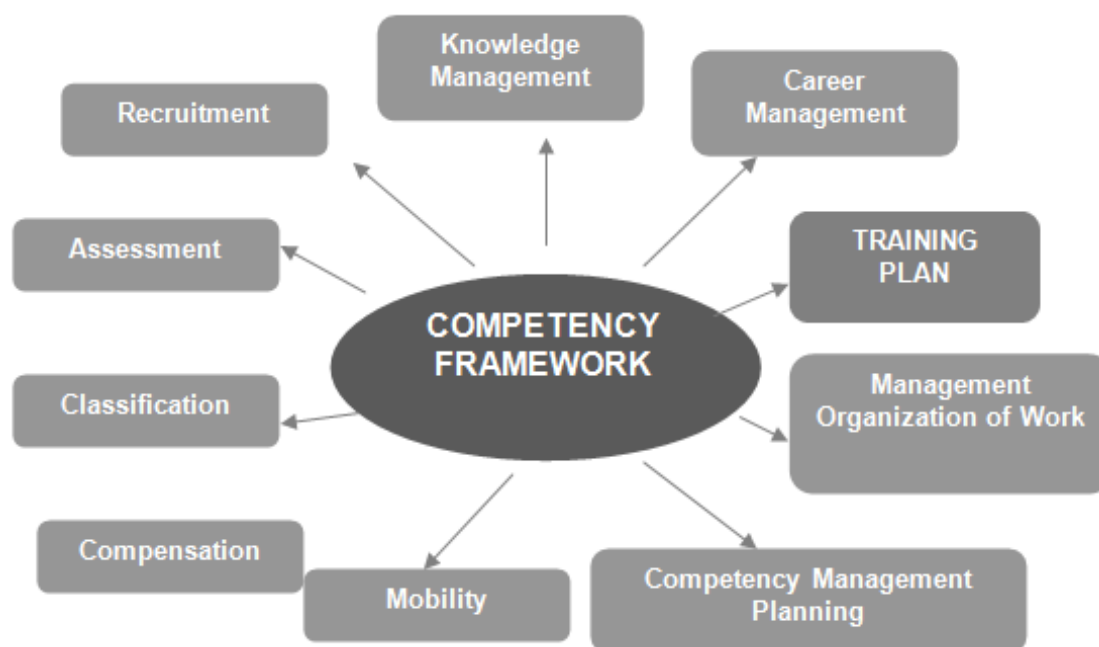


Figure 6 Various fields where competency frameworks are used

5.2.2 Step 2: Adopt a definition of competency

The vision of the concept of competency depends on how the work is organized. In a Taylorist organization, being competent means *know-how* or being able to perform a prescribed task. However, according to Le Boterf (2002), when individuals are in an open organization, where following instructions or procedures is no longer the focus, being competent actually involves *knowing how to act*, i.e. being able to manage complex professional situations, deal with events and take the initiative. It follows that all management and competency development policies must be based on hypotheses and choices regarding the organization of work.

The increasing complexity of public health, the 2003-2012 PNSP's decision to focus on learning organizations that promote the development of collective skills, collaboration and networking, lead us to a definition of competency that emphasizes **complex knowing how to act**. Although there are several definitions that address our concerns, as mentioned

previously, Tardif's definition (2006), described below, will be used as a reference and will therefore guide the discussion.

Competency is complex knowing how to act supported by the effective mobilization and combination of a variety of internal and external resources within a family of situations.

5.2.3 Step 3: Specify the format of the framework

Some authors who have studied competency frameworks (Tardif 2006, Le Boterf 2002 and Perrenoud 2001) outline the issue of difficulty applying a framework that is lacking in terms of design and form. The authors point out that many frameworks are difficult or impossible to use because they are either too cumbersome, involve large numbers of competencies, or consist of endless lists of knowledge, know-how and life skills.

Before going out in the field, it is therefore necessary to consider all relevant information that will be made available to the users, and possibly the format of the tool in order to make it as easy to use as possible.

Ideally, the framework should consist of two parts. The first part is a kind of preamble that provides background information on the framework and provides some information that users may find useful. Here are some questions that can provide the designer or design team with guidance for developing the first part of the framework:

- What is the purpose of this framework? A new field, absence of a framework, update, training plan, etc.
- What is the target audience for the competency framework?
- In what context is the framework to be developed?
- What organization, group or people are developing the competency framework?
- What is the data collection method? From whom are the data being collected? In what region(s) are they being collected?
- Etc.

This first part must be presented clearly and concisely and contain relevant information for the users.

The second part of the framework is the result of research. To accurately determine its contents, we should review the reference definition. According to Tardif, competency is exercised within a family of situations. From this standpoint, the framework designer must first collect the key professional situations encountered by the professional, divide them into families and identify the corresponding competencies. After defining the competencies based on the various families of situations, the designer or design team determines the internal and external resources that learners will mobilize and combine to act competently. This will be discussed more fully in the results interpretation phase.

The information provided in this second part includes: professional situations classified into families of situations, the competencies, and the internal and external resources. Users will use this information to perform training needs assessments and develop training plans. Table 3 provides a simple representation of all this information.

Table 3 Example of results

PROFESSIONAL SITUATIONS	COMPETENCIES	INTERNAL RESOURCES (Knowledge, skills, attitudes, etc.)	EXTERNAL RESOURCES (Documentation, database, Internet, peers, etc.)
Situation 1.1 Situation 1.2 Situation 1.3 Situation 1.4 ...	COMPETENCY 1		
Situation 2.1 Situation 2.2 Situation 2.3 Situation 2.4 ...	COMPETENCY 2		

5.2.4 Step 4: Collect the data

In accordance with the foregoing, data collection involves identifying professional situations to be analyzed in order to define the competencies needed to handle these situations. We therefore need to consider an appropriate approach consistent with our vision of competency, i.e. an approach that involves practitioners in the process of developing the framework. Otherwise, the target competencies are isolated from their context, which may lead to developing a framework that does not meet the real needs of users. This often happens in the top-down approach, which usually involves choosing from a range of competencies based on a strategic analysis of the organization's performance objectives.

The bottom-up approach involves field workers in the process of determining competencies. The approach includes exploratory examinations, individual or group interviews and other techniques to collect information from the actors in the field. These interviews provide essential information on common professional situations and critical situations experienced in the field. But what do we mean by professional situation?

The following paragraphs briefly define this concept and explain how those involved will be encouraged to describe the situations they encounter regularly in the field.

5.2.4.1 Professional situations

Identifying professional situations is one of the most complex activities of the process partly because of its subjective nature. Professionals engaged in activities give meaning to their practice and their own representation depending on their worldview. This is why the choice of

situations will be negotiated by the groups consulted and validated by other groups affected by the issue. This approach is more complex but closer to the field. However, it is not compatible with a behaviourist approach, considered as objective, which describes jobs by breaking them down into tasks and sub-tasks in order to identify the competencies required for the job.

To make the exercise easier and guide the focus groups, Perrenoud (2001) proposes guidelines involving a focus on professional situations that are simultaneously domain-specific, problematic and emblematic. According to the author:

- A professional situation is **problematic** if it cannot be resolved by common sense, requires resources that some people may not have, or requires an action or intervention.
- A professional situation said to be **emblematic** if in various ways, it occurs often enough to be a constitutive and significant feature of the job or function under study. In this sense, it is a situation that seems representative of a family of similar situations.

Example 1: As planning officer for a surveillance team, Mario indicates that he must regularly collect, analyze and compare data on population groups to generate a picture of the situation for decision making purposes.

Example 2: A stakeholder in a health and social services centre in a city in Québec says that, in order to implement the Healthy Schools program, she must initiate participatory approaches when dealing with the school board, schools, community organizations, parents, etc.

The two previous situations are both problematic because a large number of resources are needed to handle them effectively, and emblematic because they are representative of these functions.

5.2.4.2 *What is the procedure for identifying professional situations?*

To identify professional situations for review, we suggest inviting a number of people involved in the issue to participate in discussion forums. These people will identify professional situations that seem both emblematic and problematic as explained above. This will involve using several data collection techniques to generate ideas in small groups such as the nominal group technique (NGT), brainstorming, round table discussion, etc. Great care must be exercised when organizing these discussion forums. The goal is to allow participants to express themselves freely on the situations they encounter in their professional practice.

The first step is to **establish the boundaries within which the information is to be collected**. Once the **domain** has been clearly defined, the second step is to target the **population(s) affected** by the problem in order to set up groups or target individuals to be consulted. The other activity involves identifying the **regions affected** by the problem and selecting key regions to identify situations shaped by different realities. Otherwise, the competency framework will be representative of only a small group.

Once the groups and regions have been targeted, the data collection campaign must be carefully organized. As indicated above, many **data collection techniques** are used to generate ideas in small groups. The consultant(s) will take the time needed to prepare all aspects of the campaign (planning, facilitation, logistics, etc.). It should be noted that this kind of approach makes it impossible to accurately predict how much time will be spent collecting data in the field or exactly how many people or groups will be consulted. Redundant data or information overload will mean that the consultation process can cease.

The information collected in the field can be enhanced with information from other sources such as existing frameworks or documents in the field. Even if these data do not come directly from the field, they may be relevant. All professional situations should be validated by other people or groups.

5.2.5 Step 5: Process the data

The input for this step is a set of professional situations that have not yet been processed and classified into families of situations. Note that competency is defined on the basis of overall mastery of a family of situations, which means that these situations must first be grouped into a family of situations (similar situations) to identify the matching competency. Next, we should analyze the cognitive functioning underlying these situations in order to identify the resources needed to exercise this competency. Clearly, processing this data involves:

- Classifying the situations into families of situations
- Assigning a competency to each family of situations—if possible, the formulation of the competency should demonstrate its integrative, combinatorial, developmental, contextual and evolutionary character
- Identifying the internal (knowledge, know-how, attitudes, etc.) and external resources required to successfully manage the situation and develop the competency

As with professional situations, competencies must be validated by individuals or groups of people.

Collecting and processing data is a long process that requires much back and forth and readjustments. Negotiation is ubiquitous. The framework is constructed through intersubjective validation.

5.2.6 Step 6: Validate the framework

Once the framework has been completed, the next step involves validating it in its entirety. This step must not be confused with the numerous validations performed during the process. This final validation ensures that the framework is legitimate. The validation process must answer three questions:

- Are the data valid?
- Does the tool serve its intended purpose?
- Is the tool manageable?

If the process went smoothly, only minor adjustments will be required.

5.2.7 Step 7: Organize ownership of the framework

Getting the actors to take ownership of the framework is a necessary step. However, it is often overlooked. This step may involve an extensive information campaign or training sessions. Note that the more users' expectations have been taken into account, the easier it is to get them to take ownership.

5.2.8 Step 8: Maintain the system

This step ensures that the framework evolves. Situations change and instruments and machines improve, which implies changes in the resources required to develop competency. In this case, the frameworks may undergo partial review. However, frameworks sometimes become completely obsolete, because the field has changed too much or has been abandoned.

A competency framework is an essential competency development tool. It presents the **competencies** and **resources required** to effectively manage **work situations**.

A competency framework is useful both for **human resources** (recruitment, career management, mobility, etc.) and competency development (**needs assessment** and **training plan**). It is a development instrument shared by the various actors.

To develop a framework that reflects reality as closely as possible, information on **professional situations** such as those experienced in the field must be identified by consulting the **actors**.

The framework is a tool that **evolves** and can be **updated** for use with new resources (new knowledge, techniques, etc.).

6 THE VARIOUS PEDAGOGICAL STRATEGIES

This second part discusses the pedagogical strategies that we touched upon during the presentation of the theories of cognitive and constructivist learning in the first section. Note that pedagogical strategies are essential tools used to take effective action in various learning situations.

Table 4 defines and puts each strategy into context with examples from real situations. The last column of the table lists some limitations to the use of these strategies.

Table 4 The various pedagogical strategies

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Problem-based learning According to Legendre (2005), problem-based learning (PBL) is a teaching approach involving challenging students with meaningful and relevant problems that may be real or fictitious in order to develop their autonomy and involvement in solving these problems. Generally, an instructor or educator divides the students into groups of 5 to 10 and supervises them. The learners work together for several weeks. Every week they spend a few hours solving a complex problem presented by the educator. They spend the rest of their time working to solve the problem on their own. The students must take a systematic approach: read the problem and define the terms; analyze the problem; identify the knowledge to be acquired; classify this knowledge; establish research and study priorities; develop documentation; and study on their own. This method can be combined with an informal lecture, group work, exercises, a case study or individual mentoring.	Problem-based learning is widely used in nursing care and physician training. Université de Sherbrooke: A major component of the bachelor's–master's physiotherapy curriculum.	Method provides an opportunity to apply knowledge in a real context, promotes peer learning and enables feedback Competencies needed to use this strategy. The instructors or experts must be trained to keep on target.
Brainstorming Brainstorming is a technique for generating ideas, which stimulates creative thinking when looking for solutions to a given problem. It involves producing as many ideas as possible in a short time on a given topic without the ideas being criticized or judged. This method for generating ideas in a group focuses on the number of ideas, spontaneity and imagination.	Chiefly used to launch scientific or management projects.	Works in small groups.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Coaching In a coaching situation, a person, employee or manager learns from an immediate supervisor or coworker. The coaches are in direct relationship with the trainees and must therefore know their competency and performance levels. Coaches use their trainees' experience as the basis of the training to be performed in the workplace. Coaching is particularly useful for training new employees or managers, or upgrading the competencies of existing staff. This method provides trainees with the opportunity to learn both from their mistakes and their strengths. Kinlaw (2005) defines four essential competencies for good coaching: advising, guiding, training and challenging. He points out that the ability to "challenge" does not involve blaming or criticizing; instead, it is the ability to focus on the problem and not the person, and identify the action to be taken to encourage the learner to make a positive change.	HR – Succession plan to replace people who are about to retire Build a research team New managers.	Method that enables employees to get quick results, which is focused on employees searching for and implementing their own solutions. Helps individuals operate more independently. It is often difficult to recruit a coach with the required skills.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Demonstration Demonstrate actions and operations to learners Teaching method used to illustrate a given principle, process or movement. A demonstration most often involves the instructor presenting resources such as models, various equipment, films, slides, etc. During a demonstration, the instructor may question the students to highlight the key points. At the end, a summary can be provided and one of the students may repeat the demonstration, if necessary.	Use of equipment, machines and tools. Procedure: • Sterilization techniques • Handwashing	Demonstrations are seldom used with large groups. They are not suitable when very small equipment or objects are involved. This is not a comprehensive strategy. It requires additional activities to promote learning (reading and hands-on learning).
Modular training via various media Individualized teaching method used to impart information via various media (text, video and slides). Generally, the students are given an outline containing instructions for the activities to be performed, as well as a workbook to enable them to check whether they have mastered the material.	Learning objective: Online teaching on carpal tunnel syndrome http://www.santepubmtl.qc.ca/mdpr/evention/Formation/canalcarpien/index.html	Easily accessible Develops autonomy Individuals learn at their own pace. Specific objectives are achieved without an instructor having to be present. Affordable

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Peer teaching/tutoring Pedagogical strategy in which knowledge, know-how or life skills are taught by learners in a group or members of a work team who are capable of explaining them.	A member of a team who is able to use data collection software such as SurveyMonkey is asked by his supervisor to show his colleagues how to use it.	Some students may believe that they have not been taught as well as if they had been taught by an expert. The person who transmits the knowledge must be recognized by his peers.
Case studies Teaching method that involves presenting a small group (or a student) with a problem to be solved in a given field of specialization and guide them in solving it. The main purpose of the case study method is to encourage students to become involved in problem-solving approaches and assimilate them. The instructor's role is to lead the discussion towards performing the steps involved in solving a problem.	Widely used in the fields of medical and management science.	May lead learners to make general statements based specific situations if they cannot tell what makes a case specific. Depends on group cohesion and the tutor/supervisor's facilitation skills.
Educational games Teaching method in which learning activities are created as part of existing games or games invented for the occasion. Competition stimulates the players and makes the learning activities more fun.	Photo-language for youth in difficulty (social workers).	There are few games that meet the specific target objectives. Designing and producing custom games requires a lot of time and specific abilities.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Role-playing Teaching method that involves simulating a situation in which interpersonal relationships occur and having the participants take on various roles in order to rectify any behavioural issues. Role-playing differs from simulation because of the subjective nature of the vision of reality that is proposed. The learner interprets the role spontaneously and has a lot of leeway in interpreting the role. In a simulation, objective understanding is the focus. Role-playing focuses on perceptions and thus subjectivity.	Motivational approach, for example regarding blood-borne and sexually transmitted infections: sexuality and drug use among young people, drug addiction, etc.	Preparing and implementing role-playing are both very time consuming. May degenerate into major ideological debates fueled by emotion (controversial topics such as abortion, euthanasia, etc.). May be compromised if some individuals refuse or are reluctant to participate, which is why a competent facilitator is required.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Mentoring As with coaching, mentoring is a supportive interpersonal relationship. Bittar (2006) notes that coaching is typically used for repetitive tasks of a similar nature, whereas mentoring is an approach used for on-the-job training of individuals in senior positions involving complex situations. Typically, mentors are experienced people who work with a trainee for a fairly extended period of time. Mentors provide encouragement, respect their mentees and are willing to share their knowledge. Mentees seek personal and professional growth, and are willing to receive mentors' advice, knowledge and values. The mentoring relationship should be governed by a code of ethics based on specific objectives. It is built and developed over the long term.	EXTRA/FORCES program The Executive Training for Research Application (EXTRA) program develops capacity and leadership to optimize the use of research evidence in managing Canadian health care organizations. Candidates must have a mentor from the community. In collaboration with the Réseau de recherche en santé des populations du Québec (Gilles Paradis) The strategic Training Program in Transdisciplinary Research on Public Health Interventions: Promotion, Prevention and Public Policy (4P) is a complementary training program for PhD students and postdoctoral fellows interested in conducting their research on a public health priority. http://www.santepop.qc.ca/en/formation/formation4p.html.	Mobilizing one's own resources and research and implementing one's own solutions. Developing the person's autonomy (including with respect to the mentor). Involves recruiting mentors in senior positions willing to make themselves available.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Discussion method Teaching method in which a facilitator encourages students to interact with each other to share their knowledge or express their opinions on a given topic. Apart from classic discussions (roundtables), which involve 5 to 12 participants, there are other forms of discussion including debates, buzz sessions and forums. In a debate, a small number of students is divided into two groups who have to defend different views in front of other classmates. At the end of the debate, the facilitator provides a summary.	Focus group on research topics or specific activities. <i>Webinar</i> – Exchange networks on environmental health issues (Réseaux d'échange sur les enjeux en santé environnementale), a joint initiative of the INSPQ, Health Canada and the Université de Montréal. http://www.mdtrav.umontreal.ca/reese/reese.htm	Facilitators are responsible for guiding the exercise to encourage interaction and to avoid deviating from the intended objectives.
In a buzz-session, students are divided into several subgroups and discuss a topic during a limited time. The results of each group's discussion are then presented to the whole group by each subgroup's secretary for general discussion and summary.	Methodological workshop	Method that encourages participants to apply their knowledge by becoming actively involved. The secretary's role is essential because it is easy to digress from the objectives, which may result in a lack of interaction.
In a forum, a number of speakers provide an overview of a topic. The students or participants are then invited to ask the speakers questions. This is generally followed by a summary.	Many workshops at Québec Annual Public Health Days feature this type of training.	This method enables participants to freely express their thoughts on a topic. The facilitator is largely responsible for successful outcomes.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Project method In the project method, the proposed solution to the problem must also be applied by developing a project. However, in the case method, a problem is presented to an individual or a small group in order to find a solution.	Implementation of a pandemic response plan Emergency measures implementation	Projects are increasingly used as a pedagogical strategy because of their comprehensive and contextual character. It may be worthwhile involving a new employee in a learning project.
Simulations Teaching method that involves providing the students or learners with a model of a physical, social, administrative or other phenomenon, and giving them the opportunity to act on this model and observing the results of the decisions they have made. In some cases, the characteristics of simulations are combined with those of educational games to get the students more interested.	The virtual patient (Le malade virtuel), Centre des ressources d'apprentissage of the Université Laval Armed forces aircraft simulator	Risk of oversimplifying reality Too complex. Learners may find this somewhat confusing. Learners may focus on very specific, limiting situations rather than develop their ability to analyze the overall situation and take a broader view. Designing and producing custom simulations requires specific abilities and involves a lot of work.

Table 4 The various pedagogical strategies (continued)

PEDAGOGICAL STRATEGIES	EXAMPLE OF USE	COMMENTS AND LIMITATIONS
Practical training Practical training provides students with the opportunity to use the teaching that has been delivered and the knowledge acquired during training and apply it in the field. They use their theoretical knowledge to solve actual building and design problems and discover various aspects of project management and contracting works. Professional internships allow employees to update their knowledge.	Professional internships required to obtain the graduate diploma Medical residents Program for hospital laboratory technologists at the Laboratoire de santé publique du Québec, e.g., identifying medically significant fungi	Opportunity to gain real professional experience Opportunity to apply their knowledge and newly acquired skills in the field Requires an investment by the organization (workspace, computer, supervisor, etc.).
Tutoring Individualized teaching method in which the material is covered when the student or learner and tutor interact. In its classic form, the tutors deliver the content themselves, but in most cases other media are used to present information. The tutors' role then involves supervising the learner or the student's learning.	Public health microprogram delivered entirely online where the tutor provides individualized coaching for participants throughout their learning.	Involves recruiting tutors who must receive extensive training. Method may involve significant costs (tutor's wages).

7 MAIN E-LEARNING TOOLS

This third section provides an overview of the main e-learning tools mentioned in Section I. A short definition will be presented for each tool, as well as a description of its impact on teaching and learning, some potential applications, and finally its drawbacks or limitations.

This description is available in a separate document entitled *Projet innovation en formation : Phase 1* produced by INSPQ in May 2008.

7.1 DISCUSSION FORUM

7.1.1 What is a discussion forum?

A discussion forum is a collaborative tool that enables a group or subgroup of users to communicate online asynchronously (delayed time), when and where convenient.

Most forums are organized around discussion topics. The discussion forum participants explore an idea, concept or theory together. These topics are developed in discussion threads and posted. Posts are indented. Indentation is a tree structure used to reflect the dynamics of the discussions, which makes it easy to see responses to the main message.

Some forums such as online chat rooms are strictly social spaces. This type of forum provides the opportunity to get acquainted and exchange ideas; the goal is not to explore a topic, but to socialize.

Public discussion forums are open to all, whereas private discussion forums are for a group or subgroup of participants. Although anonymous discussion forums can be set up for specific reasons, some discussion forums require users to log in so that all participants can see the author's identity.

7.1.2 Impacts on teaching

According to Campos (2004), discussion forums can be set up for any activity that requires debate, such as scientific argumentation, the exploration of potential solutions, development of hypotheses, and other forms of scientific and artistic reasoning.

The creation of virtual learning communities that work together towards a common goal is one of the main benefits of discussion forums. Educators who intend to implement a collaborative learning strategy must take several factors into account in the planning phase. Depending on the objective, they will choose an appropriate pedagogical formula such as: developing topics that require learners to explore an idea, concept or theory together; a webinar in which a group of learners delivers a classroom presentation on a shared project completed through a discussion forum; or a group project.

7.1.3 Impacts on learning

Discussion forums do not simply develop cognitive competencies. This tool can help learners:

- Improve their written communication skills
- Develop their reasoning, analytical, synthesizing and argumentation skills
- Enhance their decision-making skills and autonomy
- Improve their ability to work with peers
- Engage in self-assessment and peer assessment
- Become more open-minded
- Develop a sense of ethics

7.1.4 Drawbacks

Experience has shown that there are some disadvantages to group discussions. For example, discussion forums' hierarchical structure may lead to differences of opinion, which cause participants to lose their focus. To enable the group to regain its focus, which involves moving towards a common point, the educator can implement strategies (monitoring, recapitulating, providing summaries, synthesizing ideas, etc.). Group management is another disadvantage often raised. Message overload is another disadvantage that must be noted. Educators also often mention the assessment of student participation, which involves qualitative analysis and is difficult to perform in large groups.

7.2 VIDEOCONFERENCING, INTERACTIVE WHITEBOARD AND CHATting

7.2.1 What is videoconferencing?

Videoconferencing involves transmitting video and audio information in real-time and interactively from a site to one or more remote sites, allowing for synchronous communication. (Harvey et al. 1998)

There are three types of videoconferencing: 1) point-to-point videoconferencing in which one site is connected to another, 2) point-to-multipoint videoconferencing in which a base site is connected to several other sites, and 3) multipoint videoconferencing in which several sites are connected.

Videoconferencing is often conducted with an interactive whiteboard on which all users can draw or write. Such a board is a specific visualization tool for collective use. The contents of the computer screen (document, webpage, etc.) are displayed on the interactive whiteboard and any participant can add notes, write or draw on the displayed document. Users can also write on the interactive whiteboard as they would on a blackboard in a classroom. All participants are able to view all the interactive content posted on the whiteboard. This tool is sometimes called a "SMART Board."

Other tools such as a chat function can be added when transferring files or for other purposes, which enhances discussions. Chatting is a synchronous communication tool that enable users to interact simultaneously on the Internet. Users can view live messages from others and respond immediately. If immediate feedback is required, this type of virtual meeting is ideal for conducting small group discussions.

7.2.2 Areas of use

Videoconferencing is used in all areas. It can be used for training sessions, meetings and conferences, which are referred to as remote training, conference calls and webinars. Webinars are widely used in the field of health (telehealth). According to Majed and Marqué (2003), telehealth is the electronic transfer of medical data including audio, static or dynamic images and text in real or delayed time to practice telemedicine (consultation, diagnosis, counselling and treatment) remotely, increase clinical and scientific exchanges, and facilitate access to expertise.

7.2.3 Advantages

Accessibility is one of the great advantages of videoconferencing. It can be used to reach people in remote areas and those who cannot travel for various reasons. It eliminates time constraints and travel costs. For example, Health Canada (2005) is developing programs to give remote communities and Aboriginal Canadians greater access to health care and information.

7.2.4 Drawbacks

Initial equipment costs can make it difficult to implement videoconferencing. Poor picture and sound quality may sometimes be an issue.

7.3 INSTANT MESSAGING

Instant messaging is a tool that facilitates communication and collaboration, and provides the ability to quickly communicate with someone whose ID is visible through a control panel. Instant messaging is a form of communication with multiple receivers, where multiple users can communicate in chat mode. In general, instant messaging is used for sharing various types of files quickly and increasingly for audio and/or video communication with a webcam.

Instant messaging is a synchronous tool. Meetings must therefore be scheduled when everyone can attend and time-zone differences have to be taken into account.

7.4 WIKIS

7.4.1 What is a Wiki?

A wiki is an editing tool that a virtual learning community can use to write documents collaboratively through asynchronous communication.

A Wiki has two modes: the read mode (default) and the edit mode, which displays the page so that it can be altered. Modifications or enhancements are made using a Web form for adding text, creating links, embedding images, etc. It may be opened or closed from outside as in an Intranet or it may require access rights.

Any changes to the document are automatically archived in a database with the amendment date and the author's name. Users can see how every page has changed and what every member of the virtual community has contributed.

7.4.2 Areas of use

Wikis can be used in various areas and for various purposes: training programs, courses, collaborative encyclopedias, joint projects, technical documentation, guides, project schedules, meeting minutes, writing novels, research articles, newspaper articles, text on various topics, etc. The Wikipedia website, created in 2001, is the most popular Wiki in the world.

In the field of health, the PubMed Wikipedia provides free access to the MEDLINE database of references and abstracts of biomedical research articles. In addition to medicine, it covers all fields related to this area, such as nursing science. The site also covers related biomedical sciences, such as biochemistry and cell biology. In addition, users can access other databases where they can view the entire contents of many articles.

This extremely rich site allows anyone interested to add or edit information in parts that require editing, which are highlighted by [edit].

7.4.3 Impacts on learning

To date, Wikis are considered the best online collaboration tool (Educause 2007). It harnesses collective intelligence and decentralizes knowledge and power. Learners and educators are involved in discovering and building a subject interactively. Wikis are therefore part of a "work in progress" process. According to Foutain (2007), Wikis are timeless, impersonal and never finished.

According to Stafford and Webb (2006), better results are usually achieved when small groups of people work intensively on a topic or project. According to Reinhold and Abawi (2006), learners become more motivated when they work on a topic of their choice that meets a learning requirement. Using a Wiki as a training tool, depends on the value it adds not only for the group, but also for each individual.

The collaborative nature of this tool gives learners a new way to become involved in their learning:

- Based on a person or group's input, they can make an article on a topic or issue more comprehensive by adding comments, sections, definitions, references, images or links to websites, etc. This activity develops analytical skills, and improves the ability to search for information and build an argument.

- It changes their relationship with the Internet, which generally provides information for use or analysis. In this case, the information is provided by the learners, who, like their educators, become creators of meaning in their own right.
- The evolution of collective thought drives motivation, learning and change.
- They feel that they belong to a community. They are also free to act individually and form their own opinions.
- They develop significant autonomy.
- They develop a sense of ethics (respecting the opinions of others, references, quotations, etc.).

Generally speaking, learners in a Wiki perform collaborative work that cannot be achieved in the classroom. In addition, the tool's flexibility has other advantages. It enables learners to:

- Access the content at any time from anywhere
- Edit the content at will
- See how the subject has been modified by viewing previous versions (successive versions are archived)
- Easily create new pages

7.4.4 Drawbacks

Like any tool, Wikis have weaknesses:

- Because the content can be edited, it may not be edited correctly and information may be lost.
- It is built gradually and sometimes lacks structure.
- There may be a copyright issue. Who owns the document?
- Poor group supervision may produce poor results and very low levels of participation.

7.5 BLOGS

7.5.1 What is a blog?

A blog is an editing tool used to create a kind of online diary. Blogs consist of text or posts posted on a regular basis (usually on a daily basis). Like editorials, posts are listed in reverse chronological order.

Blogs do not always contain only text. Bloggers can enrich their content with multimedia elements and hyperlinks.

Every blog can receive feedback from anyone interested in a particular post. According to Atabekian (2007), a blog's popularity can be measured by the number of comments left by visitors.

7.5.2 Areas of use

Since 2006, blogs have become a social phenomenon. The press, television, radio, publishers, researchers and teenagers use them.

In the field of health, patients who would like to share their thoughts about their condition have access to certain sites. For example, Médicalistes is a nonprofit organization that hosts discussion forums and lists websites in the field of health for those (patients and relatives) affected by rare, acute or chronic diseases. Users can have their blogs hosted there and communicate with each other.

Some educators—from primary school to the university level—now use blogs as resources for their courses.

According to Bernachez (2006), universities were among the first to recognize blogs' potential. He mentions Glenn (2003) who studied the initial experiences of academics in the field of humanities who delivered scholarly interpretations of current events to a wide audience.

7.5.3 Impacts on teaching and learning

Blogs may seem to be an individual tool (personal or intimate texts). However, like Wikis and discussion forums, they produce an environment for sharing, debating and thinking. They are tools for sharing ideas and can facilitate cooperation and building collaborative projects.

Their potential uses in the field of education are obvious. They help develop writing and critical thinking. They help develop autonomy and encourage bloggers to listen to views different from their own.

7.5.4 Drawbacks

The main drawbacks cited in the literature are:

- Information in a blog cannot be edited by others.
- Blogs need to be updated regularly to retain interest.
- The demands of regular updating may lead to diminishing quality of content.
- Information is scattered.

7.6 PODCASTING

7.6.1 What is podcasting?

Podcasting is a file distribution system that delivers radio, audio and video content automatically via subscriptions to RSS feeds. The downloads can be transferred to a portable digital player for future listening or viewing. (Office québécois de la langue française 2004).

The term “baladodiffusion” proposed by the Office québécois de la langue française is the French translation of “podcasting” inspired by Apple Inc.’s iPod. Podcasting is the delivery system and podcasts are the files that contain the information. There are various types of podcasts: audio, video, photo and radio podcasts.

RSS (Really Simple Syndication) files, described in more detail in the following section, are constantly updated and contain the latest information to be published. Because podcasts are downloaded to portable digital audio or video players, users must subscribe to an RSS network for access and have a portable digital player for downloading. Podcasts can be played on a computer.

7.6.2 Areas of use

A survey conducted by Educnet (2007) indicated that many universities around the world (United Kingdom, Canada, France and Japan) use podcasting. Experiments have demonstrated that most faculties can integrate podcasting into their teaching (health sciences, history, geography, political science, physical sciences, education, literary studies, chemistry, architecture, arts, etc.) The experiments also showed that all fields relating to language and sound (language, speech therapy, audiology, theatre, music, etc.) adopt this technology more easily.

How do these faculties use this technology? Podcasts have many uses. They are used to record courses, lectures, debates, interviews, demonstrations, surgeries, author biographies, etc.

7.6.3 Impacts on education

Podcasting was not used in the field of education until very recently, and the few studies on this technology have not really assessed the impact on teaching and learning. However, some experiments and case studies provide some indications. Researchers at Carnegie Mellon University (2007) focused on three specific uses of podcasting: 1) recording podcasts to review courses, 2) creating supplementary course material, and 3) students creating podcasts.

Educators recording podcasts for course revision purposes seems to be the most common use and the one most appreciated by learners. Technically, there is no particular drawback for educators. This use of podcasting helps educators think about their own professional practice. These recordings give them the opportunity to assess themselves, note strengths and weaknesses and adjust their teaching if necessary. It also challenges the educators, because their presentations can be archived and replayed in other circumstances and elsewhere.

Creating complementary material is more demanding. This means that educators have to have technical skills and the ability to develop multimedia products (writing, storyboarding content, etc.). Educators must develop content that is appropriate for audio or multimedia recording and meets the course’s educational objectives. Beyond these requirements, educators who start producing podcasts must consider the time factor.

Creating podcasts lays the groundwork for creating an archive of learning objects. NORMETIC (2003) defines a learning object as "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning." The indexed objects can then be used by other educators and in other contexts.

7.6.4 Impacts on learning

The flexible, mobile nature of this technology provides learners with many advantages:

- They can listen again to a lecture, presentation, meeting or music, or view again a professional act or procedure at any time and anywhere.
- If they are unable to attend a course, they can view the entire course or part of it.
- They have access to a wide range of podcasts to learn more about a topic.
- They can work at their own pace.
- That can select what they want to listen to.
- It makes it easier for them to prepare for exams or other assessments.

Class experience suggests that podcasts may help develop certain skills. Students learn to search for relevant content and assess it.

A study in the field of dentistry found that learners preferred the audio format. The study showed that the likelihood that this technology would be used increased as it became easier to find podcasts through RSS (Educnet 2007).

7.6.5 Drawbacks

Real-life experience highlights some disadvantages:

- Educators' misuse of podcasting can lead to significant gaps in learning when new knowledge is reviewed only with this technology.
- Podcasting is not suitable for content that provides a significant amount of information.
- Learners may grow accustomed to passive listening if podcasting is not combined with other activities.

7.7 RSS

7.7.1 What is RSS?

RSS is a system that provides automatic real-time delivery of information newly posted on a website (news, news updates, public service announcements, etc.).

RSS (RSS thread, RSS link, RSS channel, RSS flow or RSS feed) is a family of XML formats used to syndicate Internet content. RSS stands for Really Simple Syndication or Rich Site Summary. An RSS feed provides customized and automated delivery of information based on the user's interests. RSS subscribers do not have to go to various sites to search for news. They receive it through their subscription. Most websites that give users the

opportunity to subscribe to an RSS feed display one of these icons: **RSS** or **XML**. These icons are displayed on the home page or near one of the sections of the website.

7.7.2 Areas of use

RSS feeds are widely used on news sites such as CNN or blogs. Bloggers popularized RSSs. They are now used in all fields.

Educause (2007) noted that many universities are set up to share the latest news with the academic community. For example, in Québec, Université Laval's Ariane is a library website providing access to all the latest books. In the United States, Harvard University provides real-time access to the latest scientific research findings.

7.7.3 Advantages

RSS technology greatly reduces the time it takes to get the latest information from various websites. It saves time and makes searching more efficient.

An RSS feed is a great way for learners to access all kinds of academic and cultural information: events, courses, academic activities, research in their field, etc.

Educators can use the latest information to update their course content. As well, some educators incorporate learning objects into their courses. These learning objects are in directories such as the Multimedia Educational Resource for Learning and Online Teaching (MERLOT). This gives them the opportunity to receive information on new products that are available.

7.7.4 Drawbacks

This technology makes things so easy that it can induce passivity. Certainly, the advantages of RSSs—they save time and provide quick access to information—must not take away from actual information research.

7.8 YouTube

7.8.1 What is YouTube?

YouTube is a video-sharing website on which users can upload and view videos. The content may be informative (shows and reports), cultural (film and music clips), personal (from a personal blog), educational or professional.

Users can comment on the videos through conversations usually related to blogs. They can also access the profiles of those who uploaded the videos and contact them.

All users throughout the world can view large numbers of videos without having to enter a password. However, some videos require a password.

Educause (2006) notes YouTube's great popularity, with around 100 million new video uploaded every day.

7.8.2 Areas of use

According to Berubé (2007), YouTube is often criticized for providing content with poor-quality information, but it also offers hundreds of presentations by some of the world's most in-demand professors and experts. All fields, leisures and activities can be represented. However, there are increasing numbers of educational applications for this technology. For example, the University of California, Berkeley has implemented a program that uses YouTube to broadcast 300 hours of courses on a wide variety of subjects, ranging from bio-engineering to physics.

7.8.3 Impact on teaching and learning

An internal study by Berkeley showed that delivering courses to undergraduate students with this technology was as important to them as having access to a WiFi network on campus or having an email address. Students are quick to adopt these emerging technologies because they see them as a new way to learn. As Bérubé points out, what appeals to students is the possibility of acquiring knowledge in a variety of ways.

It should be noted that, like podcasting, this technology generally complements lectures.

One of the most widely reported advantages is the democratization of education, because these technologies provide access to knowledge throughout the world.

7.9 E-PORTFOLIOS

According to Tardif (2006), competency assessments are a multifaceted problem for educators. How can they assess the development of competencies during initial or continuous training, which may last several years? What are the most appropriate methods? How should they encourage the students or professionals to start thinking about their learning? What should be done to enable the administration and educators to track learners' progress? Portfolios are increasingly used to address this problem.

7.9.1 What is an e-portfolio?

E-portfolios are the new version of the portfolios that artists used to present to clients, containing a few samples of their work to demonstrate their ability.

According to EDUTEC (2007), the idea of e-portfolios seems to have originated in North America. In 1987, the first professional portfolio was tested in Québec and in the early 1990s, this format began to be used by educators.

An e-portfolio is a collection of computer "objects" that presents an individual's learning history. It brings together the results of his studies and training, professional experience, productions and any other relevant evidence of his achievements that highlight his competency. The collection can comprise text-based, graphic or multimedia elements.

Lorenzo and Ittelson's (2005) definition places more emphasis on reflection: "An e-portfolio is more than a simple collection, however ... the author's personal reflection on the work inside an e-portfolio helps create a meaningful learning experience." According to the Northwest Assessment Association (1999) cited in Allal et al. (1998), learners' participation in selecting content and defining work selection and assessment criteria is key.

The Ministère de l'Éducation, du Loisir et du Sport du Québec (2002) uses the term "dossier" (folder) to designate a portfolio. It identifies three types of folders, each with their own roles and functions: learning folders, presentation folders and assessment folders.

- The **learning folder** includes work of all kinds and reflections on the work that highlight the learner's progress in a given period. These are included in their portfolio as they learn. Documents are added and the content is reorganized, among other activities, on a regular basis. All these activities can lead to discussions with peers or the educator.
- The **presentation folder** generally includes the learner's best work. This type of portfolio can be presented in a professional interview.
- The **assessment folder** is used to assess the student's level of competency development. Portfolios are part of a continuous assessment process that involves gathering information from various sources to highlight the learner's learning.

7.9.2 What are the main impacts on education?

According to Lorenzo and Ittelson (2005), e-portfolios have the potential to enhance teaching and assessment practices. According to Allal et al. (1998), current uses of e-portfolios reflect various concerns. E-portfolios may focus on the assessment's formative function and the learner's metacognitive reflection. They may also be associated with summative functions and control. According to the authors, portfolios cannot respond to all assessment requirements. Educators must begin by establishing their priorities.

Beyond assessments, e-portfolios have other impacts on education:

- They enable educators to have a better understanding of individual differences and adapt their teaching to the learners.
- If educators establish a climate of trust, using e-portfolios can facilitate authentic communication between educators and students, as well as enhance cooperation.
- The results of students' work and reflections enable educators to reflect on their own teaching practices and make adjustments or revise their strategies, if necessary.
- They enable educators to engage in innovative learner-focused teaching approaches.

7.9.3 What are the main impacts on learning?

Tardif (2006) reported the findings of the work performed by Huba and Freed (2000) and Gronlund and Cameron (2004). These researchers analyzed the positive impacts on the learning of those who used e-portfolios. The main advantages were:

- **Reflective learning** was fostered by the need to argue and comment on each new entry in the e-portfolio. In addition, learners became aware of their own learning strategies.
- Learners developed **self-assessment** skills.
- **Motivation** was stimulated in various ways: involvement in the learning process, exhibition of the best work, and visible progress of learning over time.
- Learners developed a better understanding of expected **learning outcomes**.
- They developed a positive attitude in response to criticism.
- In some cases, e-portfolios enhanced cooperation among peers and between educators and learners.

7.9.4 How are e-portfolios assessed?

An e-portfolio must be assessed as a tool that provides evidence of learning. Clearly, educators must specify how learning will be assessed based on the evidence presented and the students' self-assessments.

According to Popham (2002), quoted in Tardif (2006), it is essential that e-portfolio assessment criteria be developed rigorously and fairly. The criteria must not be too general or detailed. They should be formulated based on the complexity of the competency. Educators must be aware of this difficulty, which has been raised by many authors.

7.9.5 What are the drawbacks?

Although e-portfolios are still considered the ideal instrument for observing the evolution of learning over time, like any technology, they have their limitations.

The lifespan of an e-portfolio should be based on its purpose. For people who want a lifetime e-portfolio, there may be information storage and access management problems. Also, if there are no agreements between facilities or institutions, incompatibility may be an issue.

Educators who decide to use e-portfolios will have to consider the time factor. Management and supervision entail many additional tasks: training students to use e-portfolios, regular meetings with every learner for feedback, and monitoring and assessing each e-portfolio. These drawbacks may discourage some educators from using e-portfolios.

8 CONCLUSION

All these tools are very important, but the process of developing competency frameworks remains the cornerstone of any training plan. Competency development is therefore an organizational development project because all actors must participate and organizations' human resources must be involved. This promotes concertation and better coordination of work, thereby avoiding a silo approach.

This document proposes an approach, strategies and tools designed to support the development and maintenance of competencies in public health in various environments or through various key actors. It provides an overview of learning theories and a summary of their applications. It also includes a practical tool (Section II) that will facilitate the development of competency frameworks and support actors who adopt a competency-based training approach, while promoting the standardization of processes across Québec.

Ultimately, adopting this type of approach is certainly demanding, but studies on the subject show that the gains achieved by organizations more than make up for the time devoted to the approach. The Direction générale de la santé publique of the MSSS is interested in seeking and supporting the development of learning organizations. This document provides a practical and operational contribution to the practice of an essential support function for public health actions. Structured and coordinated competency development thus becomes a lever for bringing about changes in practices in the field consistent with the update of the National Public Health Program (*Programme national de santé publique*).

BIBLIOGRAPHY

- ARGYRIS, C. et Schön, D. (1978). *Organizational learning: a theory of action perspective*. New York: McGraw-Hill.
- BASQUE, J. (1999). *L'influence des théories de l'apprentissage sur le design pédagogique*, Télé-université et École de technologie supérieure, notes de cours.
- BISSONNETTE, S. GAUTHIER, C. ET RICHARD, M. (2005). *Proposition d'un modèle d'ingénierie pédagogique basé sur les recherches en efficacité de l'enseignement*, Centre franco-ontarien de ressources pédagogiques, Ottawa.
- BRIEN, R. (1997). *Sciences cognitives et formation*, Presses de l'Université du Québec, 3^e édition.
- CHABOT, G. (2005). *Le point en administration de la santé et des services sociaux. L'approche populationnelle : plus qu'un nouveau slogan?* Volume 1, no 2, juin 2005.
- DIRECTION GÉNÉRALE DE LA SANTÉ PUBLIQUE (2008). *Programme national de santé publique 2003-2012 mise à jour en 2008*, Santé et Services sociaux, Gouvernement du Québec.
- FONTAINE, M. ET MILLEN, D. (2005). *Comprendre les avantages et l'impact des communautés de pratique*, Chronique des réseaux, Fondation canadienne de la recherche sur les services de santé.
- FORTIN, C. ET R. ROUSSEAU (1989). *Psychologie cognitive. Une approche de traitement de l'information*. Sillery/Sainte-Foy : Presses de l'Université du Québec/Télé-université.
- GIARDINA, M. (1999). *L'interactivité, le multimédia et l'apprentissage : une dynamique complexe*, Education et formation, L'Harmatan, Paris.
- GUILBERT, L. (2000). *Introduction à l'analyse qualitative*, recueil de notes de cours.
- HARRIGAN, M. (2000). *En quête de qualité dans les soins de santé canadiens. Amélioration continue de la qualité*, 2^e édition, Vancouver.
- HENRI, F. (2001). Des cours sur le Web à l'université *in les TIC au cœur des pédagogies universitaires. Diversités des enjeux pédagogiques et administratifs*, Presses de l'université du Québec, p. 117-143.
- HONEBEIN, P.C., DUFFY, T.M., ET FISHMAN, B.J. (1993). Constructivism and the design of learning environments: Context and authentic activities for learning in *Constructivisme learning*, p. 87-108, Berlin.
- ISCOL (2004). *Types de communautés d'apprentissage*, International Scientific Committee on Communities of Learners and Knowledge building Communities.
<http://www.iscol.org/iscol.html>.
- JOANNERT, P. (2009). *Compétences et socioconstructivisme : un cadre théorique*. Perspective en éducation et formation, De boeck, Bruxelles.

- JOUVENOT, C. ET PARLIER, M. (2003). *Élaborer des référentiels de compétences : principes et méthodes*, Éditions Réseau Anact, Lyon.
- KARSENTI, T. et LAROSE, F. (2001). TIC et pédagogies universitaires. Le principe du juste équilibre in *les TIC... au cœur des pédagogies universitaires. Diversités des enjeux pédagogiques et administratifs*, Presses de l'Université du Québec, p. 1-17.
- LABESSE, M-E. (2008). *Cadre de référence sur l'analyse de besoins de formation. Volet formation continue*, Institut national de santé publique du Québec (INSPQ). http://www.inspq.qc.ca/pdf/publications/800_Cadre_de_reference.pdf.
- LAFORTUNE, L., OUELLET, S., LEBEL, C ET MARTIN, D. (2008). *Réfléchir pour évaluer des compétences professionnelles à l'enseignement. Deux regards, l'un québécois et l'autre suisse*, Collection Éducation-Intervention, Presses de l'Université du Québec.
- LANGELIER, L. (2005). *Travailler, apprendre et collaborer en réseau : guide de mise en place et d'animation de communautés de pratique intentionnelles*, Cefrio, Montréal.
- LAPOINTE, J.J (1992). *La conduite d'une étude de besoins en éducation et en formation*, Sillery, Presses de l'Université du Québec, Québec.
- LAVE, J. et WENGER, E. (1991). *Situated Learning: Legitimate Peripheral Participation*, New York, Cambridge University Press.
- LE BOTERF, G. (2000). *La mise en place d'une démarche de compétence : quelques conditions de réussite*, PERSONNEL N° 412, août-septembre 2000.
- LE BOTERF, G. (2006). *Construire les compétences individuelles et collectives*, Éditions d'Organisation, Paris.
- LE BOTERF, G. (2002). *Ingénierie et évaluation des compétences, 4^e édition entièrement renouvelée*, Éditions d'Organisation, Paris.
- LEBRUN, M. (2007). *Théories et méthodes pédagogiques pour enseigner et apprendre. Quelle place pour les TIC dans l'éducation*, Perspectives en éducation et formation, de Boeck, Belgique.
- LEGENDRE, R. (2005). *Le dictionnaire actuel de l'éducation*, 3^e édition, Guérin, Montréal.
- LEGENDRE, M-F. (2001). *Sens et portée de la notion de compétence dans le nouveau programme de formation*, Université de Montréal.
- LEGENDRE, M-F. (2005). Lev Vygotsky et le socioconstructivisme en éducation In *La pédagogie : théories et pratiques de l'Antiquité à nos jours*, p. 333-349, Gaétan Morin Éditeur, 2^e édition, Montréal.
- LOUIS, R. JUTRAS, F. et HENSLER, H. (1996). *Des objectifs aux compétences : implications pour l'évaluation*, Université de Sherbrooke, Revue canadienne de l'Éducation 21, 4 p. 414-432.

- MARQUIS, C. ET SAUVÉ, L. (1995). *La sélection des médias. Théorie et pratique*. Télé-université.
- MORIN, E. (1990). *Introduction à la pensée complexe*, Édition ESF, Paris. Télé-université.
- NGUYEN, D-Q. ET BLAIS, J-G. (2007). *Approche par objectifs ou approche par compétences? Repères conceptuels et implications pour les activités d'enseignement, d'apprentissage et d'évaluation au cours de la formation clinique*, Pédagogie médicale, volume 8, n° 4, novembre 2007.
- PAQUETTE, G. (2002). *Modélisation des connaissances et des compétences - un langage graphique pour concevoir et apprendre*, Presses de l'Université du Québec.
- PERRENOUD, P. (1995). *Des savoirs aux compétences. De quoi parle-t-on en parlant de compétences?* Pédagogie collégiale, Vol.9, n° 1.
- PERRENOUD, P. (2001). *Construire un référentiel de compétences pour guider une formation professionnelle*, Université de Genève, 2001.
- PINEAULT, R. ET BRETON, M. (2006). *L'approche populationnelle : fondements théoriques et applications pratiques*, Université de Montréal. <http://www.greas.ca/publication/pdf/pineaultbreton2006mai.pdf>.
- SAVOIE-ZAJC, L. ET KARSENTI, T. (2000). *Introduction à la recherche en éducation*, Éditions du CRP, Sherbrooke.
- SCALLON, G. (2004). *L'évaluation des apprentissages dans une approche par compétences*, Éditions du Renouveau Pédagogique Inc.
- SENGE, P. (1991). *La cinquième discipline, l'art et la manière des organisations qui apprennent*, First Editions, Paris.
- SZYLAR, C. (2006). *L'apprentissage dans les organisations*, Hermes Sciences publications.
- TARDIF, J. (2006). *L'évaluation des compétences. Documenter le parcours de développement*, Chenelière Éducation, Montréal.
- TÉLÉ-UNIVERSITÉ DU QUÉBEC (2008). <http://www.telug.quebec.ca/>.
- VON GLASERSFELD, E. (1995). *Radical constructivism: a way of knowing and learning*, London.
- WIGGINS, G. (1989). A true test: Toward more authentic and equitable assessment, in *Phi Delta Kappa*, p. 703-714.
- WILSON, B.G. (1996). What is a constructivist learning environment? In *Constructivist learning environments. Case studies in instructional design*, Englewood Cliffs, NJ : Educational Technology Publications, p. 3-8.

APPENDIX

SURVEY OF COMPETENCY FRAMEWORKS IN THE FIELD OF PUBLIC HEALTH

SURVEY OF COMPETENCY FRAMEWORKS IN THE FIELD OF PUBLIC HEALTH

This appendix identifies a number of competency frameworks in all fields of public health. These frameworks, designed for training in Québec and in other countries, can be used as reference tools by various interested public health stakeholders. The frameworks produced in Canada and particularly in Québec are listed in a table (S.1), which provides information on their provenance (institution or author), competency statements, the target audience and the date of release. Frameworks from other countries are listed in a second table (S.2) and can be viewed by clicking on the hyperlink.

Table 5 Survey of competency frameworks in public health

Framework Title	Competency Statement	Institution Author	Target Population	Year
Lactation consultant competencies	Competency 1: Provide adequate care for mothers and their children. 1. Ability to refer to useful theoretical knowledge concerning lactation. 2. Ability to assess a child's physical, psychological and cognitive development. 3. Ability to assess the mother's condition. 4. Ability to help the mother make informed choices and provide guidance on optimal health care. 5. Ability to follow up based on the mother's mental and psychological state. Competency 2: Provide clinical lactation management. 1. Ability to prevent breastfeeding problems and/or difficulties. 2. Ability to manage breastfeeding problems and/or difficulties. Competency 3: Communicate effectively in interpersonal relationships. 1. Ability to communicate with the mother and family. 2. Ability to transfer knowledge and give advice. Competency 4: Manage professional activities with scientific rigour. 1. Ability to update and improve their knowledge.	Nidale El-Sokhn Université de Montréal. Internship report produced at the Institut national de santé publique du Québec (INSPQ)	Health professionals working in 12 CSSSs in the Montérégie area interested in becoming lactation consultants. Regional respondents from the Direction de santé publique (DSP) were asked to identify professionals who might be interested in participating in the study.	2007

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Competency 5: Act professionally as a lactation consultant. 2. Ability to maintain professional and ethical standards in terms of conduct and practices.			
Outbreak investigation skills	Competency 1: Investigate an outbreak. 1. Ability to detect and confirm the presence of an outbreak. - Element 1.1. Knowledge of community health and environmental monitoring data in the field of public health. - Element 1.2. Ability to use monitoring data. - Element 1.3. Ability to interpret monitoring data. 2. Ability to confirm case diagnosis. - Element 2.1. Ability to develop a case definition. - Element 2.1. Ability to support front line professionals in selecting appropriate laboratory tests for an investigation. - Element 2.3. Ability to interpret laboratory test results. 3. Ability to perform a case search. - Element 3.1. Knowledge of additional sources of information. - Element 3.2. Ability to set up appropriate case search procedures.	Laurence Bernard and Céline Farley INSPQ	– Public health (PH) coordinators to validate organizational aspects. – Professionals from various teams— infectious disease, environmental health and occupational health—from Québec's Directions régionales de santé publique.	Outbreak investigation skills

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	4. Ability to perform a preliminary case investigation. - Element 4.1. Ability to develop an appropriate survey questionnaire. - Element 4.2. Knowledge of strategies for administering survey questionnaires. 5. Ability to describe the situation (characteristics of time, place and people) and develop a hypothesis. - Element 5.1. Ability to organize data. - Element 5.2. Ability to interpret descriptive data (epidemic curve, frequency table and attack rate). - Element 5.3. Ability to formulate testable hypotheses. 6. Ability to verify hypotheses using analytical epidemiological methods. - Element 6.1. Knowledge of analytical epidemiological methods. - Element 6.2. Ability to determine the appropriate method for the type of investigation. - Element 6.3. Ability to identify situations that provide a rationale for conducting further investigation, such as a case-control or cohort study. - Element 6.4. Ability to conduct an analytical epidemiological study in well-defined circumstances. - Element 6.5. Ability to interpret the findings of epidemiological studies with an etiological focus.			

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Competency 2: Monitor control measures. 7. Ability to coordinate survey results monitoring (or ability to contribute to monitoring activities). - Element 7.1. Knowledge of general principles for applying control measures. - Element 7.2. Knowledge of partners' role and mandates. Competency 3: Effectively communicate the results. 8. Ability to adequately disseminate survey results. - Element 8.1. Ability to develop recommendations for the public, the workplace and partners. - Element 8.2. Ability to use appropriate language to explain the risk to the various groups concerned.			
Competencies for Transfusion safety clinical officers	Competency 1: Participate in designing, updating and coordinating the transfusion safety program in terms of transfusion practices including transfusion programs. Competency 2: Monitor transfusion activities and conduct investigations required for the study of transfusion accidents/incidents. Competency 3: Recommend changes and/or actions that optimize the quality of transfusion practices.	Labesse, M.E. INSPQ	Transfusion safety clinical officers	Competencies for Transfusion safety clinical officers

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Competency 4: Collaborate in developing and planning the continuous training programs for various stakeholders in the field of transfusion medicine. Competency 5: Ensure communication between blood banks and users. Competency 6: Participate in providing information to blood product users. Competency 7: Write and update procedures. Competency 8: Ensure the clinical quality and safety of blood transfusions.			
Competencies for Transfusion safety technical officers	Competency 1: Pilot the Integrated Information System on Transfusion and Hemovigilance (<i>Système d'information intégré sur les activités transfusionnelles et d'hémovigilance</i> or SIAATH) at the regional level. Competency 2: Collect and analyze statistical data for blood product and blood substitute inventory management. Competency 3: Participate in updating and coordinating the transfusion safety program in terms of blood bank practices. Competency 4: Monitor transfusion activities and the traceability of blood products. Competency 5: Ensure communication between the blood bank laboratory and associated or affiliated centres.	Labesse, M.E. INSPQ	Transfusion safety technical officers	Competencies for Transfusion safety technical officers

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Competency 6: Monitor blood bank activities. Competency 7: Recommend changes and/or actions that optimize the quality of transfusion practices. Competency 8: Collaborate in developing and planning continuous training programs for Blood bank technologists.			
Competencies for Transfusion safety officers and Blood bank technologists	Competency 1: Collect blood specimens and enter them in the computer system. Competency 2: Analyze specimens. Competency 3: Enter the results on the computer or record them on paper. Competency 4: Manage inventories. Competency 5: Interpret, communicate and document data. Competency 6: Receive requests and prepare and send products in health care units and other hospital facilities. Competency 7: Understand how the workplace is organized. Competency 8: Ensure occupational safety.	Labesse, M.E. & Farley, C. INSPQ	Transfusion safety clinical and technical officers and Blood bank technologists (via questionnaire); A group of Hematologists and Laboratory technical coordinators (via telephone survey).	2006

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
Competencies for reprocessing medical devices	Competency 1: Collaborate in developing and planning the continuous training program for sterilization. - Element 1.1. General knowledge of needs assessment tools. - Element 1.2. Ability to assess continuous training needs. - Element 1.3. Ability to write learning objectives. - Element 1.4. Ability to select pedagogical strategies. - Element 1.5. Ability to develop pedagogical tools. - Element 1.6. Ability to use knowledge transfer software. - Element 1.7. Ability to write a continuous training specification. - Element 1.8. Ability to facilitate pedagogical activities. - Element 1.9. Ability to promote knowledge transfer software. - Element 1.10. Ability to plan programs to update knowledge for new sterilization employees. - Element 1.11. Ability to coach employees. Competency 2: Manage and disseminate documentation information. Ability 2.1. Manage sterilization documentation. - Element 2.1.1. Technical knowledge of the equipment. - Element 2.1.2. Technical knowledge of sterilization procedures.	Laurence Bernard INSPQ	Each Director General of a CSSS was asked to appoint one or more key sterilization employees (reprocessing of medical devices) in their facility. The key sterilization employees were given a provincial-level questionnaire to validate their continuous training needs for reprocessing medical devices.	2007

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	- Element 2.1.3. Technical knowledge of chemical and enzyme solutions. - Element 2.1.4. Technical knowledge of reusable medical devices. - Element 2.1.5. Ability to use various documentary sources. - Element 2.1.6. Ability to select relevant documentation. - Element 2.1.7. Ability to update documentation. Ability 2.2. Synthesize sterilization documentation. - Element 2.2.1. Ability to interpret information based on the needs of your environment, keeping safety in mind. - Element 2.2.2. Ability to adapt information to the needs of your environment keeping safety in mind. - Element 2.2.3. Ability to write procedures based on the documentation. - Element 2.2.4. Ability to develop decision algorithms based on the documentation. Competency 3: Develop quality control and monitoring indicators. - Element 3.1. Knowledge of standards. - Element 3.2. Ability to develop monitoring indicators. - Element 3.3. Ability to validate standards.			

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
Competencies for nurses in infection prevention and control in long-term care.	Competency 1: Manage infection prevention and control in the community. Ability 1. Assess the adequacy of existing outbreak management and Infection Prevention and Control (IPC) protocols depending on the context. - Element 1.1. Adapt an existing IPC protocol to the context of a residential and long-term care facility (Centre d'hébergement et de soins de longue durée or CHSLD). - Element 1.2. Adapt an existing outbreak management protocol to the context of a CHSLD. - Element 1.3. Develop an IPC and outbreak management protocol. - Element 1.4. Based on the context of a CHSLD, assess the risk of transmission of nosocomial infections. - Element 1.5. Access relevant information sources easily. - Element 1.6. Know the relevant sources of information. - Element 1.7. Know the principles of cleaning, disinfection and sterilization in CHSLDs. - Element 1.8. Know environmental IPC measures. - Element 1.9. Know the risk factors for nosocomial infections related to the host and the environment. - Element 1.10. Know IPC measures (basic practice and additional precautions).	Laberge-Homsy, M.	Nurses working on infection prevention and control in long-term care facilities	2008

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Ability 2. Apply IPC and outbreak management protocols by engaging the stakeholders. - Element 2.1. Assess the knowledge needs of the target audience. - Element 2.2. Develop a training program. - Element 2.3. Develop strategies to promote compliance with protocols. - Element 2.4. Develop strategies to overcome resistance to change. - Element 2.5. Adapt the entire training program for various types of employees. - Element 2.6. Develop intervention strategies to address ethical issues. - Element 2.7. Work with various departments and committees. - Element 2.8. Know the various types of learning. - Element 2.9. Know the characteristics of people and the environment that have an impact on compliance with IPC measures. - Element 2.10. Know the phases of educational intervention. - Element 2.11. Assess the effectiveness of the IPC and outbreak management protocols.			

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Ability 3. Develop and implement a simple communication plan. - Element 3.1. Adapt communication to the events and the target audience. - Element 3.2. Write and clearly communicate relevant information to the appropriate people. Ability 4. Prioritize the IPC program activities. - Element 4.1. Define the role of IPC nurses. Competency 2: Manage a monitoring program. Ability 1. Develop and implement a monitoring program. - Element 1.1. Prioritize the type of monitoring required. - Element 1.2. Develop a data collection tool based on the context of the CHSLD. - Element 1.3. Detect the occurrence of an outbreak or significant infectious event at any time. - Element 1.4. Prioritize the collection of relevant information. - Element 1.5. Analyze the information collected based on statistical principles. - Element 1.6. Use data analysis software. - Element 1.7. Develop a monitoring report. - Element 1.8. Develop recommendations based on report results. - Element 1.9. Know the various types of monitoring.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	- Element 1.10. Know the sources of relevant information for detecting nosocomial infections in CHSLDs.			
Competencies of health professionals in the field of Immunization	<i>1. Immune system and vaccines</i> Competency 1: Explain how vaccines work using basic knowledge of immune system. <i>2. Vaccine-preventable diseases</i> Competency 2: Demonstrate an understanding of the rationale and benefit of immunization, as relevant to the practice setting. <i>3. Vaccine development and evaluation</i> Competency 3: Integrate into practice knowledge about the main steps in vaccine development and evaluation. <i>4. The types of immunization agents and their composition</i> Competency 4: Apply the knowledge of the components and properties of immunizing agents as needed for safe and effective practice. <i>5. Population health</i> Competency 5: Apply relevant principles of population health for improving immunization coverage rates.	Public Health Agency of Canada (PHAC)	Health professionals	Nov. 2008

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	<i>6. Communication</i> Competency 6: Communicate effectively about immunization in a way fitting the needs of the practice. <i>7. Storage and handling of immunizing agents</i> Competency 7: Implement Canadian guidelines when storing, handling or transporting vaccines. <i>8. Administration of immunizing agents</i> Competency 8: Prepare and administer immunizing agents correctly. <i>9. Adverse events following immunization</i> Competency 9: Anticipate, identify and manage adverse events following immunization, as appropriate to the practice setting. <i>10. Documentation</i> Competency 10: Document information relevant to each immunization encounter in accordance with national guidelines for immunization practices and jurisdictional health information processes. <i>11. Populations requiring special considerations.</i> Competency 11: Recognize and respond to the unique immunization needs of certain population groups.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	<i>12. The Canadian immunization system</i> Competency 12: Demonstrate a good understanding of the immunization system in Canada and its impact on the practice. <i>13. Immunization issues</i> Competency 13: Address immunization issues using an evidence-based approach. <i>14. Legal and ethical aspects of immunization</i> Competency 14: Act in accordance with legal and high ethical standards in all aspects of immunization practice.			
Core Competencies for Public Health in Canada Release 1.0	Category 1: Public health sciences <i>Competency statements:</i> 1.1 Demonstrate knowledge about the following concepts: the health status of populations, inequities in health, the determinants of health and illness, strategies for health promotion, disease and injury prevention, and health protection, as well as the factors influencing the delivery and use of health services. 1.2 Demonstrate knowledge about the history, structure and interaction of public health and health care services at local, provincial/ territorial, national, and international levels. 1.3 Apply the public health sciences to practice.	Public Health Agency of Canada (PHAC)	Public health	Sept. 2007

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
	1.4 Use evidence and research to inform health policies and programs. 1.5 Demonstrate the ability to pursue lifelong learning opportunities in the field of public health. Category 2: Assessment and analysis <i>Competency statements:</i> 2.1 Recognize that a health concern or issue exists. 2.2 Identify relevant and appropriate sources of information, including community assets and resources. 2.3 Collect, store, retrieve and use accurate and appropriate information on public health issues. 2.4 Analyze information to determine appropriate implications, uses, gaps and limitations. 2.5 Determine the meaning of information, considering the current ethical, political, scientific, socio-cultural and economic contexts. 2.6 Recommend specific actions based on the analysis of information.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Category 3: Policy and program planning, implementation and assessment <i>Competency statement:</i> 3.1 Describe selected policy and program options to address a specific public health issue. 3.2 Describe the implications of each option, especially as they apply to the determinants of health and recommend or decide on a course of action. 3.3 Develop a plan to implement a course of action taking into account relevant evidence, legislation, emergency planning procedures, regulations and policies. 3.4 Implement a policy or program and/or take appropriate action to address a specific public health issue. 3.5 Demonstrate the ability to implement effective practice guidelines. 3.6 Evaluate the action, policy or program. 3.7 Demonstrate an ability to set and follow priorities, and to maximize outcomes based on available resources. 3.8 Demonstrate the ability to fulfill functional roles in response to a public health emergency.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Category 4: Partnerships, collaboration and advocacy <i>Competency statement:</i> 4.1 Identify and collaborate with partners in addressing public health issues. 4.2 Use skills such as team building, negotiation, conflict management and group facilitation to build partnerships. 4.3 Mediate between differing interests in the pursuit of health and well-being, and facilitate the allocation of resources. 4.4 Advocate for healthy public policies and services that promote and protect the health and well-being of individuals and communities. Category 5: Diversity and inclusiveness <i>Competency statement:</i> 5.1 Recognize how the determinants of health (biological, social, cultural, economic and physical) influence the health and well-being of specific population groups. 5.2 Address population diversity when planning, implementing, adapting and evaluating public health programs and policies. 5.3 Apply culturally-relevant and appropriate approaches with people from diverse cultural, socioeconomic and educational backgrounds, and persons of all ages, genders, health status, sexual orientations and abilities.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Category 6: Communication <i>Competency statement:</i> 6.1 Communicate effectively with individuals, families, groups, communities and colleagues. 6.2 Interpret information for professional, non-professional and community audiences. 6.3 Mobilize individuals and communities by using appropriate media, community resources and social marketing techniques. 6.4 Use current technology to communicate effectively. Category 7: Leadership <i>Competency statement:</i> 7.1 Describe the mission and priorities of the public health organization where one works, and apply them in practice. 7.2 Contribute to developing key values and a shared vision in planning and implementing public health programs and policies in the community. 7.3 Utilize public health ethics to manage self, others, information and resources. 7.4 Contribute to team and organizational learning in order to advance public health goals. 7.5 Contribute to maintaining organizational performance standards. 7.6 Demonstrate an ability to build community capacity by sharing knowledge, tools, expertise and experience.			

Table 5 Survey of competency frameworks in public health (continued)

Framework Title	Competency Statement	Institution Author	Target Population	Year
Public health competencies for executives and front line professionals	Competency 1: Analyze and assess population data. Competency 2: Plan disease prevention and health promotion programs and interventions and their assessment. Competency 3: Analyze a public health problem. Competency 4: Implement action strategies. Competency 5: Communicate effectively.	Direction Recherche, formation et développement, INSPQ	Executives and practicing professionals	2008
Health promotion competency framework	Competency 1: Plan health promotion actions. 1.6 Collect and analyze information. 1.7 Develop action plan. 1.8 Develop plans for monitoring and evaluation. 1.9 Develop dissemination plan for results and process. Competency 2: Form partnerships with organizations and communities to enhance health. 2.1 Lobby for organizations and communities to participate in addressing health issues. 2.2 Initiate and develop strategic links with key people. 2.3 Negotiate actions with a range of organizations and communities to enhance health.	Health promotion workforce (New South Wales, Australia)	Health promotion personnel	August 1994

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	Competency 3: Market positive health practices. 3.1 Contribute to creating demand for health promotion actions, products and environments. 3.2 Encourage industry and other sectors to engage in further production and enhancement of health-promoting environments. 3.3 Provide information. 3.4 Use media to persuade communities, organizations and individuals to adopt positive health practices. 3.5 Work with groups to change knowledge, skills and practices. Competency 4: Develop health-promoting competency in other people. 4.1 Coordinate and implement activities to develop knowledge, skills and values. 4.2 Develop opportunities for others to gain experience in promoting health. Competency 5: Manage activities. 5.1 Prioritize activities. 5.2 Coordinate day-to-day activities. 5.3 Use resources effectively to achieve goals. 5.4 Maintain financial accountability. 5.5 Work with people productively. 5.6 Monitor activities.			

Table 5 **Survey of competency frameworks in public health (continued)**

Framework Title	Competency Statement	Institution Author	Target Population	Year
	5.7 Ensure planned and evaluation occurs. Competency 6: Continue professional development 6.1 Establish and communicate personal goals in professional development. 6.2 Maintain and update professional competency. 6.3 Prepare and deliver reports for professional review.			

Table 6 Public health competency frameworks throughout the world

Title	Institution/Author	Area / Specialty / Function	Year
Council on Linkages: Core Competencies for Public Health Professionals ¹ http://www.phf.org/link/core-061109.htm	Public Health Foundation	Public health	June 2009
Public Health Social Work Standards and Competencies http://oce.sph.unc.edu/cetac/phswcompetencies_may05.pdf	Kathleen Round, University of North Carolina, School of Social Work	Social workers	2005
Core Management Competencies for Public Health Managers http://www.cdc.gov/smdp/corecomp.htm	CDC, Atlanta	Managers	Online
The MACH Model: From Competencies to Instruction and Performance of the Public Health Workforce http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2569981/	K. R. Miner, W. Kurz Childers, M. Alperin, C. Cioffi, N. Hunt	Training	2005
Continuous Education in Environmental Health – Part I: A Literature Review of Continuous Education and Core Competencies in Environmental Health http://www.ciphi.ca/pdf/ccbournea.pdf	S. Bourne, Ontario Ministry of the Environment	Environmental safety	Environmental Health Review, 2005
The Cost of Implementing the Generic Public Health Competencies http://www.pha.org.nz/documents/AppendixOneCostsofImplementingGenericCompetenciesforPublicHealth.pdf	Diane Salter, New Zealand	Decision-makers	2007

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
Development of a Core Competency Model for the Master of Public Health Degree http://www.asph.org/userfiles/AJPHSept08_Development_MPH_Core_Competency_Model.pdf	J. Calhoun, K. Ramiah, E. McGean Weist, S. M. Shortell American Journal of Public Health	Health professionals	Sept. 2008
Public Health Competencies: End Program Template http://www.neomed.edu/MPH/uploads/File/Student_Resources/ExitEval.pdf	USA		Online
International Initiative for Mental Health Leadership http://www.iimhl.com/IIMHLUpdates/20070502.pdf	International Initiative for Mental Health Leadership, New Zealand	Mental health	2007
Generic Competencies for Public Health in Aotearoa–New Zealand http://www.pha.org.nz/documents/GenericCompetenciesforPublicHealthMarch2007.pdf	Public Health Association of New Zealand	Public health	2008
Concentration Specific Competencies http://www.umass.edu/sphhs/sites/default/files/ConcentrationSpecificCompetencies.pdf	University of Massachusetts	Public health	Online
Dental Public Health Competencies http://www.uchsc.edu/sod/programs/Public%20Health/DPHCompetencies%2098.pdf	Journal of Public Health Dentistry	Dentists	1998
Core Competencies for Public Health in Canada http://www.phac-aspc.gc.ca/ccph-cesp/index-eng.html	Public Health Agency of Canada	Public health	Sept. 2007

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
Public Health Core Competencies Initiatives http://www.opha.on.ca/programs/phcc.shtml	Ontario Public Health Association (OPHA)	Public health	
Profile of public health executives. Assessment			
Immunization Competencies for Health Professionals	Professional Education Working Group of the Canadian Immunization Committee	Immunization	May 2008
Compétences essentielles requises pour les professionnels de la santé publique. Discussion papers for members of Québec's Direction de la santé publique, de la planification et de l'évaluation (DSPPE)	Régie régionale de la santé et des services sociaux Montérégie	Public health	Jan. 2002
Youth Violence and the Health Professions: Core Competencies for Effective Practice http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/19/ef/a2.pdf	Southern California Developing Center on Youth Violence Prevention	Youth Violence and the Health Professions Working Group	Nov. 2001
Core Public Health Worker Competencies for Emergency Preparedness and Response http://www.phf.org/resourcestools/Documents/emergencypreparednesscorecompetencies_Columbia_University.pdf	Center for Health Policy Columbia University School of Nursing	All Public Leaders/administrators Professionals Technical/support	April 2001
Competencies for Emergency Preparedness http://www.albany.edu/sph/coned/t2b20302.pdf	Columbia University School of Nursing	Nurses	March 2002

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
Women's Health Care Competencies for Medical Students: Taking Steps to Include Sex and Gender Differences in the Curriculum http://groups.medbiq.org/medbiq/download/attachments/558/WomensHealthCareCompetencies.pdf?version=1	Women's Healthcare Education Office (WHEO)	Women's Health and Gender-specific Medicine	Dec. 2001
Dictionary of competencies – Local public health officials	Julie Dufort, RV	Community health	March 2006
Core learning outcomes in sexual and reproductive health and HIV for medical undergraduates entering Foundation Training http://www.ffprhc.org.uk/pdfs/coreLOsSexReproHxHIVjune2005.pdf	BASHH and University of Leeds	Sexual and reproductive health and HIV	2005
Informatics Competencies for Public Health Professionals http://www.nwcphp.org/docs/phi/comps/phic_web.pdf	O'Carroll, MD, and the Public Health Informatics Competencies Working Group Northwest Center for Public Health Practice	Public Health Informatics Competencies	Aug. 2002
WHO Global Competency Model http://www.who.int/employment/WHO_competencies_EN.pdf	WHO	Public health	2008
Référentiels professionnels des assistants de service social [professional frameworks for social services assistants] http://a_sylvie.club.fr/Decouvertes/referentielAS.html	Comité de Résistance du Social (CRS)	Social services assistants	
Core Competencies for Public Health Professionals https://www.train.org/Competencies/corecomp.pdf http://www.trainingfinder.org/competencies/list_nolevels.htm	Council on Linkages Between Academia and Public Health Practice	Health professionals	

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
ASPH Education Committee Master's Degree in Public Health Core Competency Development Project http://www.asph.org/userfiles/Version2.3.pdf	ASPH (Association of Schools of Public Health)	Public health professionals	Aug. 2006
TURNOCK, B.J. (2006). <i>Public Health: Career Choices That Make a Difference</i> , University of Illinois, Chicago.	School of Public Health – University of Illinois at Chicago	All public health stakeholders	2006
PHAC report – A Set of Minimum Competencies for Medical Officers of Health in Canada (Report is available in French)	Public Health Agency of Canada Medical Officers of Health Competencies Working Group, under the Direction of Hilary Robinson	Medical Officers of Health Public health professionals	March 2009
Towards establishing a platform of shared skills sets and competencies for public health doctors	<u>Riffaud A</u> , <u>Jourdan D</u> , <u>Gerbaud L</u> .	Public health professionals	March 2006
EP: Emergency Preparedness http://www.sph.unc.edu/nciph/public_health_competencies_1023_7899.html	University of North Carolina	Public health	Online
Competencies https://practice.sph.umich.edu/micphp/competencies.php	University of Michigan School of Public Health	Public health	Online
Core Competencies http://www.nwcphp.org/centers-projects/environmental-health-center/core-competencies	University of Washington	Public health	Online

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
Identifying Core Competencies for Public Health Epidemiologists http://journal.cpha.ca/index.php/cjph/article/view/1645/1829	Suzan J. Bondy, Ian Johnson, Donald C. Cole, Kim Bercovitz	Public health	Aug. 2008
Public Health Core Competencies: A Discussion Paper http://www.phred-redsp.on.ca/Docs/Reports/PublicHealthCoreCompetenciesDiscussionPaper.pdf	Public Health Research, Education and Development Program.	Public health	2006
Competencies for Public Health Informaticians http://www.cphi.washington.edu/resources/PHICompetencies.pdf	University of Washington	Public health informaticians	2008
Provisional Lists of Public Health Core Competencies http://www.aspher.org/pliki/pdf/competenciesphase1report.pdf http://www.aspher.org/index.php?site=core_competencies_in_ph&PHPSESSID=3457c4de38027e21d7a9452a39b1a2d7	Association of Schools of Public Health in the European Region (ASPHER)		2008
Improving Your Skills in Chronic Disease Prevention: Core Competencies and Skills Enhancement for Public Health http://www.ncth.ca/cdpac/presentations/tuesday/lowe.pdf	Public Health Agency of Canada	Chronic diseases	2006
http://www.mentalhealth.org.nz/resources/Core_competencies_May_2006.pdf	Public Health Association of New Zealand Inc.	Mental health	2006
Master of Public Health Competencies http://www.hawaii.edu/publichealth/academics/mphcomp.html	University of Hawai'i Office of Public Health Studies	Public health	

Table 6 Public health competency frameworks throughout the world (continued)

Title	Institution/Author	Area / Specialty / Function	Year
Australian Competencies for Public Health Medicine http://afphm.racp.edu.au/documents/competency_areas0709.pdf http://afphm.racp.edu.au/training/trainingphm.cfm	Australasian Faculty Public Health Medicine	Doctors	March 2009
Instructional program, Core Public Health Courses http://www.sph.umn.edu/img/assets/9141/26bi2.pdf	University of Michigan School of Public Health	Public health	2006
Defining core competencies for epidemiologists working in communicable disease surveillance and response in the public health administrations of the European Union http://www.episouth.org/doc/r_documents/articolo_eurosurveillance.pdf	Eurosurveillance, weekly release	Infectious diseases	2007?
Competencies for NIH Employees http://hr.od.nih.gov/workingatnih/competencies/default.htm	National Institutes of Health, USA	Public health	Online
Department of Environmental Health, Degree Planners, Ergonomics Competencies http://apps.sph.harvard.edu/content/competencies.cfm?DepartmentCode=EH&ProgramCode=EH&SchemaCode=EH_SM2erg Environmental Epidemiology Competencies http://apps.sph.harvard.edu/content/competencies.cfm?DepartmentCode=EH&ProgramCode=EH&SchemaCode=EH_SMEe	Harvard School of Public Health	Environmental safety, etc.	Online
Competency Based Standards for Health Promotion in NSW	Health Promotion Unit		



EXPERTISE
CONSEIL



INFORMATION



FORMATION

www.inspq.qc.ca



RECHERCHE
ÉVALUATION
ET INNOVATION



COLLABORATION
INTERNATIONALE



LABORATOIRES
ET DÉPISTAGE

Institut national
de santé publique

Québec

