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Interdisciplinary Practices in Primary Education in Quebec: Results from Ten Years of Research

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Abstract: The authors present a typology of the interdisciplinary representations and practices of primary teachers in Quebec based on the results of research carried out over the last ten years. The poles of two crossed continua illustrate four principal tendencies. These tendencies show representations and practices that are far from the idealized conception of reciprocity among scholarly disciplines promoting the establishment of effective complementary methods and constructive linkages.

Introduction

THE AIM OF THIS ARTICLE is to present a typology of “interdisciplinary” practices emerging from several studies of primary teachers in Quebec over a ten-year period. In most Western countries, the question of interdisciplinarity is strongly debated within the context of educational reform and teacher education. It constitutes a central issue in official and scientific discourse as evidenced by the large number of publications on the topic, most of them in English, but also in French, Portuguese, Spanish, and other languages. The concept of interdisciplinarity is pivotal in current educational reforms in francophone Belgium, Brazil, Colombia, the United States, Ontario, Quebec, and elsewhere (Lenoir and Sauv e, 1998a, 1998b), while, in the United States, Klein (1998) reports on the abundance of initiatives in a country qualified as the *el dorado* of interdisciplinary studies (Huber, 1992, p. 197). Since the beginning of the 1970s in Quebec, the expression “subject matter integration” has frequently replaced the concept of interdisciplinarity, but

Quebec's Ministry of Education has chosen to make interdisciplinarity one of the key concepts of the reform of teacher education currently underway and of the impending reform of the primary curriculum.

Thus, the term is widespread and often invoked in the field of education by teachers, school administrators, government bureaucrats, program-builders, and by those responsible for teacher education in universities. However, studies have shown that the term has several meanings; this polysemy, bordering on cacophony, does not help to distinguish among the senses that interdisciplinarity seeks to convey. A cursory analysis of scientific and official publications reveals, at best, a hesitation and, at worst, a great confusion about the meaning of the term with reference to its significance and its uses (Armstrong, 1988; Benson, 1982; Gozzer, 1982; Klein, 1990; Lenoir, 1991). There is no doubt that the word carries ambiguities which obscure its meaning. Such is the case in Quebec where the concept of interdisciplinarity is invested with multiple meanings giving rise to a semantic confusion. Little wonder that teachers resort to practices which are deemed interdisciplinary but, upon closer examination, prove questionable.

In the actual context of curricular reforms based on interdisciplinary principles, the implementation of plans of action for teachers requires a solid knowledge of how teachers understand interdisciplinarity and its practical uses. For these reasons it has become necessary to draw up a profile of these practices.

Methodology

Overview

The profile of these "interdisciplinary" practices has emerged from several surveys and field observations carried out on a population of 500 primary school teachers in Quebec over the last ten years. The typology developed in this article is built upon the results of field research consisting of direct observations of teaching practices and on an analysis of the social representations of teachers with reference to interdisciplinarity and its practices.¹ Other field studies are underway or about to begin.²

Table 1 briefly presents information on these studies: data on the time-span and nature of the research, spatial fields, data collection techniques, population samples, and principal researchers.

Table 1: An Overview of Research Projects

Year	Title of Research Projects	Spatial field	Data Collection	N	Researcher
1990-1991	<i>Relationships between interdisciplinarity and integration of learning in the teaching of the primary curriculum in Quebec</i>	Rural & semi-rural, principally in the province of Quebec	Survey questionnaire <i>Post hoc</i> validation: teachers instrument for determining educational action profiles	250 teachers	Yves Lenoir
1991-1994	<i>Pedagogical interdisciplinarity in primary grades: an action research on the evolution of the representations and practices of teachers</i>	Four school districts in the Quebec city region	Semi-structured interviews at beginning and end of process. Scale for identifying educational action models, locus of control, and hierarchy of subject area at the end of the process	15 teachers at the beginning; 10 at the end	Yves Lenoir François Larose Diane Biron Louise de Broin
1992-1995	<i>The representations of primary home room teachers in Quebec about pedagogical interdisciplinarity & its actualization in practice</i>	Rural and semi-urban districts in the province of Quebec	Survey questionnaire (open-and close-ended questions); scale for identifying educational action models, locus of control and hierarchy of subject area (end of process); Semi-structured interviews at end of process (N=13)	200 teachers	Yves Lenoir François Larose Carlo Spallanzani
1995-1998	<i>Didactic competencies and the education of primary teachers in an interdisciplinary perspective</i>	Urban and semi-urban, Sherbrooke school district, province of Quebec	Semi-structured interviews Conceptual definitions Survey questionnaire	32 teachers, professors, lecturers 66 students 312 teachers professors, lecturers, students	Yves Lenoir François Larose Carlo Spallanzani <i>and associate researchers</i>

Social Representations and Practices of Interdisciplinarity

In order to clarify the conceptual bases and the theoretical framework which underlie our research projects, a brief presentation of the concept of social representation and its relation to interdisciplinary practice is necessary.

Anticipation of Intervention

The educational intervention of a teacher is a social and individual human action that is strongly conditioned by the social representations that s/he has built and must, as a teacher, take into conscious consideration.³ Francophone

scientific literature distinguishes two conceptual forms of representation: object representation and social representation.

The individual carries out, at the object level, the concept of representation that describes both the process and the product of symbolic reconstruction established on reality-based data. This reality can be perceived directly by the subject through direct or indirect experience, resulting from a process of observation of interactions between others or between the self and the physical world. Through exposure to individual or social discourses, one can also perceive in a symbolic manner whether the discourses are systematized or not. The work of researchers who define themselves as constructivists, such as Piaget, or neo-Piagetians (Fireman, 1996; Garnier and Bednarz, 1995; Gordon and Olson, 1998; Pascualleone, 1996), relate to the first level of the concept of representation. This form of representation illustrates the building of mental imagery as it corresponds to the process of a child's vocabulary acquisition, or the construction of a skill as it corresponds to the realization of complex information treatment of some mathematical object, such as algebraic algorithms.

At the social level, the concept of representation describes the construction process of a common discourse within a community, as well as the descriptive content of this social discourse with reference to an object of common interest. In psychology, social representations are considered the constructs which insure the link between cognition and conation and which act as interfaces between contextual variables and the conduct of subjects.⁴ On the one hand, these representations are social insofar as they integrate descriptive and normative statements about a given reality or a symbolic social object. On the other, they are also social because they convey, integrate, and modify through a social discourse. "Competence-based learning" as imposed by the Quebec Ministry of Education is the informal definition of this very concept that they build and share through their interactions with their peers. The interactive process characterizing the reactions of teachers dealing with a new central concept such as competence-based learning and the teachers' attempts to translate it into guidelines for their teaching practices and attitudes are illustrations of the process of building a social representation. The organized discourse resulting from this process of defining or actualizing a competence; discussing the expectations of a teaching strategy oriented toward competence-based learning; and assessing the sets of professional behaviors that result from this informal, yet professional, process are all instances illustrating the shared cognitive and conative components of a social representation.

The development and evolution of social representations correspond, there-

fore, to the elaboration of a symbolic object. This permits a common communication and action within a given social group which, in turn allows for the consolidation of the identity of the subject as a social actor (Abric, 1994; Elejabarrietta, 1996; Jodelet, 1989). Recent scientific literature emphasizes the double function of social representations (Larose, Lenoir, and Lavallée, 1999; Moliner, 1993, 1995; Moliner and Tafani, 1997). On the one hand, they have a conative or instrumental function that facilitates individual action within a set social context and, on the other, a cognitive function permitting both the learning of descriptive characteristics of a symbolic object and its context of reference.

North American research on reflexive thought has emphasized the importance of representations in the determination of human conduct in this second sense. Current research (Charlier, 1989) points to the necessity of taking into account teacher thinking in order to establish favorable conditions for the introduction of new teaching situations and for the eventual modification of pedagogical practices. Those practices are largely determined by decisions taken in the pre-active phase—at the time of the anticipation of the action—as shown by Clark and Peterson (1986) and Crahay (1989), i.e., whether this planning is formal or more akin to “mental imagery” (Clandinin, 1986; Morine-Dersheimer, 1978), internal routines (Leinhardt, Weidman, and Hammond, 1987; Yinger, 1987), or metaphorical constructions, making teachers “storytellers” (Elbaz, 1991; Gudmundsdottir, 1990; Raymond, Butt, and Yamagashi, 1991).

In turn, the decisions made by teachers during the planning phase—to the extent that these strongly influence their action during the interactive phase—rests largely upon social representations as understood through the social psychology concept (Abric, 1987; Deschamps and Clémence, 1990; Doise, 1986; Moscovici, 1961, 1986). The same can be said of decisions made by teachers at the time of action improvisation during the interactive phase (Abdeljalil, 1993; Lecigne and Castra, 1997; Snellman and Raty, 1995).

Social Representations and Interdisciplinarity

The representation held by primary school teachers in Quebec are helpful neither in clarifying the concept of interdisciplinarity nor in the promotion of coherent and reflexive interdisciplinary practices. Indeed, extreme confusion is evident in their discourse on the representations of interdisciplinarity. As we have pointed out elsewhere (Lenoir, 1991, 1992), discursive and praxeological confusion reigns in teaching, the result of a “conceptual superposition of non-complementary and often contradictory orientations” (Lenoir,

1992, p. 51). Nonetheless, it is important to underline that this confusion is situated at the conceptual level and that a certain coherence characterizes teaching practices. At an empirical level, teachers often resort to the use of techno-instrumental models (tricks, recipes, routines) where learning is often reduced to the acquisition of technical abilities.

Field observations reveal that these practices are not interdisciplinary. The discourse on interdisciplinarity hides practices characterized by the primacy of certain socially-valued disciplines and by an increase in the time allocated to their teaching, at the expense of social knowledge relevant to the subject areas deemed to be “secondary” (Lenoir, 1991, 1992; Larose and Lenoir, 1995; Larose, Lenoir, Bacon, and Ponton, 1994). For instance, during the 1980s, the discourse of the Quebec Ministry of Education has successively valued expressions and concepts such as “subject matter integration” and “interdisciplinarity.” Both informally accompany a parallel discourse, emanating from the Ministry and disseminated through the media, about the weaknesses characterizing the teaching of French as the mother tongue in the elementary school system. As a result, research carried out with nearly 1000 teachers in the early 1990s shows that the majority claimed to use interdisciplinary practices in the classroom, but did not differentiate interdisciplinarity from the integration of subject areas. The social definition of both concepts was done through a practice which emphasized French and which used the other school subjects as a field to justify this very specific teaching. The main reason and advantage given to “interdisciplinary practices” was to increase the time given to teaching French in the weekly schedule. In doing so, the teachers reacted in a double way, being politically correct in response to both the formal and the informal pressures of the institution.

Through this phenomenon, the interdisciplinary discourse of certain teachers is akin to what Doise (1986) and Abric (1994) have identified as the justification function of social representations. The teacher seizes upon interdisciplinarity as a social need, a response to a wishful realization, or a politically correct concept. Moreover, if the teacher perceives pressure from the media or administration to increase the hours and attention allotted to parts of the curriculum objectives, and, if there exists conceptual confusion about interdisciplinary or integrative practices, then the practitioner is able to justify *a posteriori* a myriad of potentially contradictory pedagogical activities. This, meanwhile, ensures a concomitant coherence in relation to the social discourse promoted by administrators or peers.

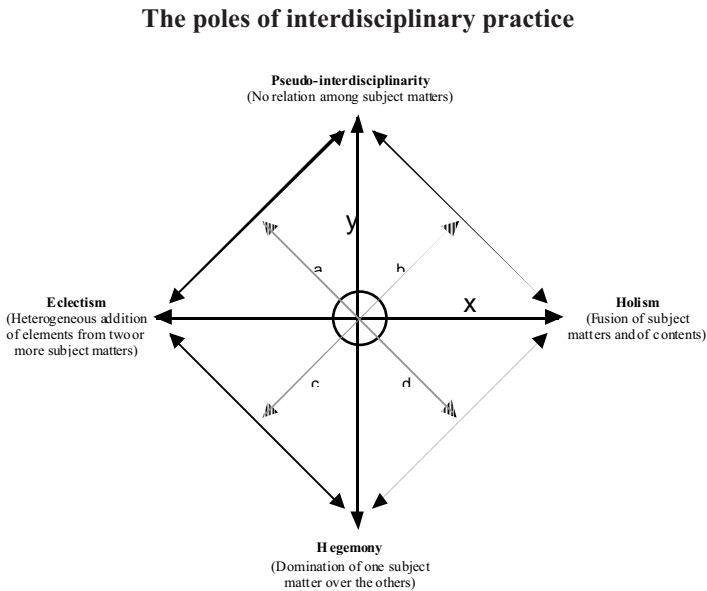
The social representations of teachers are idiosyncratic; they borrow elements from different models, which they then modify, adapt, and integrate

into their own structure. These models often rest upon unconsciously held beliefs far removed from educational theories, as Argyris and Schön (1976) have demonstrated by distinguishing between *theories espoused* and *theories in use*.

A Typology of Interdisciplinary Practices: Four Principal Types

Results from various studies demonstrate that teachers have recourse to “interdisciplinary” practices which go from “potpourri” to “polarity” (Jacobs, 1989) or which lead to dominant relationships if not to the absence of any relationships between subject areas (Lenoir, 1991). As illustrated in Figure 1 below, these four types of practices constitute the polar extremes of two crossed continua.

Figure 1: The Poles of Interdisciplinary Practice



These results lead us to identify the pseudo-interdisciplinary approach as the one most often used by primary teachers in the early grades.⁵ This ten-

gency is caused principally by the teachers' desire to stimulate their students' interest. Upper-grade, primary teachers utilize this hegemonic approach the most. This tendency is largely explained by the attention that it brings to the teaching of French, as we shall see. An eclectic approach is found without any distinction in all the primary grades, while a holistic approach is prevalent among teachers adhering to the open and active pedagogy, centered upon the learners' interests, which was valued in Quebec in the 1970s. The teachers were, however, responsible for their own learning and left to fend for themselves. In other respects, teachers whose principal objective is to meet the curricular requirements from a strictly administrative point of view employ the hegemonic, eclectic, and holistic approaches. In such a case, these approaches are no more than excuses for an absence (or a quasi-absence) of teaching in certain subject areas, officially obligatory, but socially considered secondary. The teaching of art, the natural sciences, and the social sciences are of particular concern.

The First Pole: The Eclectic Approach

At the first pole of the x-axis, teaching consists of the transmission of disconnected and decontextualized heterogeneous elements from various subject areas regrouped without predetermining their structuring and insuring their pertinence, all in the name of integrative practices. Jacob's expression of "potpourri" characterizes this sprinkling of disunited elements; it can also be described as a "destructuring eclecticism."

A dramatic and sad illustration of this practice occurred in Quebec, where teachers from the Montreal Catholic School Commission endeavored to integrate subject areas.⁶ The teachers proposed the integration of subject areas as a solution to the problem of adequately applying the official curriculum. They were confronted with multiple problems, especially the realization that "most of the time the only subjects which are taught in their entirety at the primary level are the basics: French, mathematics and English" (Bédard-Milot, et al., 1984, p. 6). In the belief that intermediary objectives were the immediate object of their teaching while terminal objectives were the outcomes of teaching, they chose to use the former as their organizational and planning base (p. 7). "Without a preconceived plan and using our experience as practitioners as our point of reference," they regrouped some 682 intermediary and terminal objectives from the third-grade curriculum into 21 modules covering the school year along subject area lines (pp. 8-9). This literal interpretation produced an artificial amalgam of different curricula objectives leading to a scattering of cognitive elements without taking into ac-

count structural logic. For example, the neighborhood (intended as a topic for five percent of the school year) was retained as a “module” (in effect, as a theme) when local space was one of the ten-month fields of exploration (objects of study). The notion of orientation was retained in a similar fashion, when in fact it was only a technical ability, to be developed to be sure, but only insofar as it would help to grasp the notion of local space and its cartographic representation more precisely. Intending to focus on “know-how,” these teachers completely ignored the learning processes embedded in the curriculum and the specificity of each element: the subject areas aimed at constructing reality, those aimed at the expression of this reality, and those favoring the establishment of links with the constructed reality (Lenoir, 1990, 1991).

Discussions with these teachers made clear that they believed they were “integrating subject areas.”⁷ It is precisely because of this fact, also frequently observed in other schools since 1980, that the principal author of this article decided to focus on the question of interdisciplinarity in teaching. He concluded that the integration of subject areas observed in the primary grades led to the disintegration of learning. Among other things, his research highlighted the absence of interdisciplinary teacher education for primary school teachers. Left alone, the teachers’ knowledge of interdisciplinarity is based on empirical trial-and-error and their theoretical frameworks are reduced to corridor talk with their colleagues. Without pre-service or in-service university education or documentation—for most do not read the scientific literature—primary school teachers adopt an approach based on empirical groping, which is at best characterized as pluridisciplinarity.

Pluridisciplinarity, also found in the pseudo-interdisciplinary approach, must be denounced. It tends to make-believe that the simple proximity (bringing together) of subject areas is sufficient to establish an interdisciplinary activity. Perrenoud points out that “the juxtaposition of closed disciplinary teachings in the mind of the same person does not create, by magic, inter or transdisciplinarity” (1997, p. 88). Boyer (1983) and Lenoir (1991) have shown the limits of thematic teaching, which, adopting the characteristics of pluridisciplinarity, is too often a caricature of the interdisciplinary approach. Where Brazeau (1980) denounces the trap of pluridisciplinarity—for he detects a destructive eclecticism—and Faure (1992) sees a mystification, Gusdorf uses the expression “magic mentality” to denote this frequent interdisciplinary false consciousness. The false consciousness consists of “regrouping specialists of different areas with the idea that such a gathering would suffice in triggering a common field and a common language among these individu-

als who have, in other respects, nothing in common” (1967, p. 1089). Such is the case of pluridisciplinarity, where, as Klein (1990) specifies, disciplinary specialists work side-by-side in an additive fashion and, as Petrie (1976) adds, without integrating effect.

In short, interdisciplinary practice does not rest upon a cumulative perspective, no more than, as Poincaré noted metaphorically, a heap of bricks makes a house! The aggregation is insufficient, whether it is curricular, as when subject areas are regrouped, or a practice, as when the pluridisciplinary model (Gozzer, 1982) is employed. Moreover, for Berger (1972), it is not enough to recognize the multi-dimensionality of all real situations and the possibility of different perspectives in order to establish interdisciplinarity. It is not because a student takes courses in one or more disciplines that his or her education is interdisciplinary—though it is assuredly eclectic. As Radest (1975) points out, the student receives only a simple exposition of fields of study linked in an additive manner; this conception rests upon a naive psychology and on a positivist, cumulative vision of interdisciplinarity.

The Second Pole: The Holistic Approach

The second pole of the first continuum represents an antidisciplinary attitude, leading to the exclusion or trivialization of all reference to disciplinary conceptual structure and limiting the search for answers to daily life practices. Claiming the necessity of a holistic, global approach to human life in the name of daily realism and of the intellectual functional mode of childhood, this approach, pushed to its extreme, leads to the fusion of the different learning objectives into a blurred whole.⁸ Frequently, one can observe teachers or publishers who propose thematic approaches. They apply a general but unique learning process that connects educational objectives gathered from many or all parts of the curriculum so as to ensure an education said to be integrated or global. In Quebec, several examples illustrate this tendency with diverse rationales for adopting such a holistic option. Some authors extol a holistic and organic perspective in the name of humanism (Angers and Bouchard, 1984), others in the name of motivation of the children’s interests and, more generally, of the postulates of the ‘New School’ (Desrochers-Brazeau, 1979, 1986). Still others do so in the name of respect for the learning process of children (Franceur-Bellavance, 1986)—occasionally identified as the spontaneous (Bouchard, 1986) or natural method (De Flandre, Charbonneau, and Thibert, 1986), or as a problem-solving method (DeFlandre, 1986), or finally, in the name of publishers’ financial interests (Turcotte and Lenoir, in press). From a practical point of view, many teach-

ers adopt this thematic approach for pragmatic and organizational motives.

Unfortunately, certain interesting aspects of this topic are beyond the scope of this article, but the major flaw of this type of interdisciplinarity lies in its simplistic vision of teaching, fundamentally centered upon the application of a general learning process. On the one hand, this approach claims a syncretic communion of teaching contents in a unique curriculum, a fusing perspective, wishing to eliminate all specificity among various subject areas which compose it. However, as we have shown elsewhere (Lenoir, 1990, 1991), each subject area has a specific and complementary place and function within the curriculum. On the other hand, this approach also rests upon the idea that learning must occur in reference to a common process, seen as “natural,” identical to the one that a child uses in daily life, or as a problem-solving process. Now and then these two processes are confused and judged identical. Whatever the option, the idea of a recourse to a unique learning process is unacceptable because it conjures away the different methods of scientific character that a human being must learn and use: the conceptualization method (How to know that?), the communication method (How to say that?), the experimental method (How to verify that?), and the problem-solving method (How to do that?).⁹ Each of these has specific characteristics relative to the goals pursued. In this matter, Fourez (1994, 1998) makes clear the complementarity which ought to exist between the method of establishing what he calls an “island of rationality” related to a general methodology and specific methods pertinent to different scientific disciplines which are called upon in an interdisciplinary approach.

Moreover, if we have already shown how much the claim of the so-called natural process is insufficient in school and is, for all practical purposes, an aberration (Lenoir and Laforest, 1994), *panproblematism* turns out to be a reductivist practice of learning processes. It resorts, not to an exclusive method which would act as a panacea, but to several methods owing their particularities to the intentions of the actors. At the very least, it is important to distinguish between a “problem posing education” constituting a set of problems in the sense claimed by Paulo Freire (1974), procedural problem solving as claimed by the neobehaviorist school of thought, particularly Gagné (1970) or Flavell (1985), and the traditional notion of problem solving as used in mathematics.¹⁰

This concludes our consideration of the x -axis options. If the x -axis represents the degree of fusion or dispersion among subject areas, the y -axis represents the intensity of relations from dominance to the absence of relations among subject areas.

The Third Pole: The Pseudo-Interdisciplinary Approach

On the second continuum (the y-axis), the first pole emerging from the study of teaching practices is that of pseudo-interdisciplinarity. In this case, the identification of a theme serves as a pretext and a thread of continuity for compartmentalized teaching of selected school subject areas. Data analysis collected on interdisciplinary practices reveals a strong presence of the thematic approach in which a specific theme functions uniquely as a mechanism for setting mono-disciplinary activities in motion. In such a case the link exists only at the level of the situating activity for the unfolding of subsequent autonomous and separated activities, according to the learning contents of different curricula. It is interesting to observe that such practices may easily shift to those identified earlier as potpourri and holism and that such shifting is reciprocal, as illustrated by the arrows *a* and *b* in Figure 1.

Notwithstanding the paucity of literature available to illustrate this conception of interdisciplinarity, we have frequently observed that teachers turn to it often in their practice. For instance, “a learning scenario in social studies on Amerindians may become the trigger or the motive for the reading of Amerindian legends (imaginary texts) in French” (Martin, 1989, p. 9). This example illustrates well the danger of believing that this approach is both interdisciplinary and integrating. In this case, the social sciences are reduced to playing a role of figuration. They serve as a triggering device; it is therefore only a pretext for the pursuit of learning objectives in language arts, especially French. The only integration existing here is a risk of disintegration of the social sciences by making them disappear at the level of learning. Only appearances remain! In the same vein, a visit to a farm, carried out as a situating, triggering activity, may lead to classroom activities rooted in each subject area without the establishment of conceptual and methodological links except at the level of the theme!

Thus, many teachers consider that selecting a theme (a visit, a feast, a particular event, etc.) and conceiving independent activities in the subject areas are sufficient to ensure an interdisciplinary approach. Without denying that thematic approaches may awaken an eventual interest in the student, in themselves, they do not ensure the implementation of interdisciplinary activities. At best, as we mentioned with reference to the eclectic approaches, they actualize pluri-disciplinary practices.

The Fourth Pole: The Hegemonic Approach

Lastly, at the fourth pole, teaching rests upon the model of the subject area deemed the most important, removing the specifics of the other subject areas and reducing them to a state of servility or of pretext. While Jacobs (1989) uses the term “polarity,” Barré de Miniac and Cros (1984) speak of “pre-dominance” to characterize this type of interdisciplinary relation from which interdisciplinary teaching is conceived either as the application of a learning process (e.g., a communication or problem-solving process) to all learning situations, or as the reductive use of the content of a subject area simply as vicarious material for the teaching of another subject area. Such practices are not rare in Quebec, particularly in the teaching of French. For our part, we qualify such relations as hegemonic in the sense that a given subject area imposes its internal logic and learning method upon other related subjects, and that these are in turn reduced to pretexts—vicarious or, at best, didactic material.

In Quebec, given the pre-eminence ascribed to the teaching of French, teachers report resorting extensively to oral and written communications from a thematic perspective. Learning activities are carried out with, or start from, French. Teachers say, for example, “reading is carried out from a context of natural sciences;” “we ‘slip’ the social sciences in in French;” “we do an oral presentation on our preferred animal;” “we compose a prayer in French;” “we do a written report on a theme.” In addition, the theme is often defined by the French manual, or another complementary textbook, rather than by the subject area of the social or natural sciences. Finally, as a last example, a schoolbook presented as interdisciplinary (Collection *Mémo*) exclusively adopts the communication model preferred for the teaching of French.¹¹ We wish to emphasize that here as well, practices pertinent to this pole may shift towards practices related to holism or eclecticism (to potpourri), as illustrated by the arrows *c* and *d* in Figure 1.

Several studies carried out since 1980 with Quebecois primary school teachers (Lenoir, Larose, Grenon and Hasni, in press a, b), clearly show the existence of a stratification of school subject areas among teachers, one which remains stable over time. Thus, of five research projects, the last three directed by Lenoir (see Table 1), one notes a stable representation of the subject areas’ hierarchical importance which make up Quebec’s primary curriculum (Table 2).

Table 2: Hierarchy of Subject Areas Taught in Primary School According to the Five Surveys

Rank	CSE (1981) ¹²	Laforest research (1988)	Lenoir research (1990)	FCAR research (1993)	CRSH research (1997)
1	French	French	French	French	French
2	Mathematics	Mathematics	Mathematics	Mathematics	Mathematics
3	Physical ed.	Social sciences	Social sciences	Social sciences	Social sciences
4	Social sciences	Natural science	Physical ed.	Natural science	Natural science
5	English	English		English	English
6	Health	Physical ed.	English	Personal/soc.ed.	Physical ed.
7	Moral education	Arts	Personal/soc.ed	Religion	Personal/soc.ed
8	Natural sciences	Personal/soc.ed	Religion	Moral ed. Visual arts	Visual arts
9	Religion	Moral ed.	Visual arts	Physical ed.	Moral ed.
10	Sexual ed.	Religion	Music	Music	Music
11	Music		Moral ed.	Drama	Drama
12	Drama		Drama	Dance	Dance
13	Manual		Dance		Religion
14	Dance				

Clearly, whether we consider the importance attributed to the subject areas taught, their hierarchical representation as basic and secondary areas, or the average real time of teaching (Table 3), it is evident that primary teachers attach top priority to the teaching of French and to mathematics—whatever the angle of approach.

Table 3: Comparison Among the Importance of Subject Areas Taught in Primary School, Their Rank as Basic and Secondary Subject Areas and the Average Time Devoted to Their Teaching (Lenoir, 1990)¹³

Importance attached	Basic area-secondary area	Average teaching time
French	French	French 35.3 %
Mathematics	Mathematics	Mathematics 24.6 %
.....	
Social sciences	English	Religious education 6.8 %
.....	Social sciences 6.1 %
Physical education	Physical education	Physical education 5.3 %
Natural sciences	Social sciences	Natural sciences 4.4 %
English	Personal/social education	Moral education 4.3 %
Personal/social education	Religious education	Visual arts 3.9 %
Religious education	Moral education	English 3.7 %
Visual arts	Natural sciences
.....
Music	Music	Music 2.7 %
Moral education	Visual arts
.....	Drama
Drama	Dance	Dance 0.5 %
Dance		Drama 0.4 %

Religious education, judged as both a secondary subject and of little educational importance, is third with reference to average weekly teaching time, a discrepancy which is explained by institutional control. According to results from the last two surveys, even though religion is considered to be of little importance, it is always taught according to the officially allotted time. Inversely, English, Quebec's second language, and a subject area judged to be important, ranks ninth in average weekly teaching time. Two principal factors could explain this inconsistency; teachers of the lower-primary grades reduce this average time because, except in certain rare exceptions, English is not taught in the first three grades or teachers who should teach this subject do not, for reasons ranging from poor knowledge of English to political or cultural ideological choice. Finally, arts, and particularly dance and drama, are always left to the last.

When teachers establish links among subject areas, French predominates, far ahead of mathematics and social sciences; next are the visual arts and natural sciences. In the case of links between French and the social sciences, the content of the latter serves only as a pretext or vicarious material for the former. The same applies also to any other link established between any subject area, except French and mathematics. Results show a gap between the theoretical options (choice of subject areas to be linked) and practice (reference citation to these subject areas), which is illustrated, for example, by the situation of mathematics and inversely, in the natural sciences and drama, more chosen than cited.

Conclusion

This article has presented a typology of interdisciplinary practices emerging from several surveys and field observations carried out in Quebec since the beginning of the 1970s. The typology brings out four major tendencies in the interaction of representations and practices to which teachers resort. These four general types are linked to didactic interdisciplinary models (Lenoir, 1997) which, in some cases, are very far from offering a real synergy of the contents of school subject areas considered.

Thus, in the world of the primary school, recourse to interdisciplinarity is frequently a justification for curricular arrangements and pedagogical practices which do not respect educational outcomes, disciplinary structures, or learning processes. Several surveys of primary teachers, carried out under the direction of Yves Lenoir since 1989, testify to the different drifts and shifts resulting from aims incompatible with educational objectives. For example, school administrators use an official speech on the promotion of interdisciplinarity

to formally incite teachers not to teach certain obligatory elements of the curriculum or, at the least, to reduce the time allotted to that curriculum (Bacon, 1995; Lenoir, 1992). These administrators are responding to real social expectations, those of parents who are concerned only with their children learning the basics (the three Rs), the political elite who favor the teaching of French as affirmation of a French presence in North America, and the economic system, which requires mathematics.

Moreover, a great number of teachers turn to interdisciplinarity for motives linked to the management of their teaching, seeking to solve organizational problems, “teaching problems” rather than learning problems (Larose and Lenoir, 1995, 1998; Larose, Lenoir, Bacon, and Ponton, 1994; Lenoir, 1992, 1997). What passes for interdisciplinarity is often a caricature, and is far from being enriching and effective insofar as the teaching-learning relationship is concerned. Interdisciplinarity practices used by teachers or proposed in school textbooks are rooted in didactic models which have little to do with well thought-out interdisciplinarity.

This presents a very somber picture! The reader should remember that this is a typology which expresses the extremes of what primary teachers think and do when turning to interdisciplinarity. It is not for us to pass judgment on teaching practices, for they reflect social tendencies. The point is rather, to highlight the necessity of reconsidering these practices, evaluating what should be implemented in order to favor and support the learner’s own processes of integrating learning, both as analytic and action tools. This manner of thinking—teaching in terms of the students’ learning processes—is even more urgent when we are faced with the fact that primary-grade students experience great difficulties in learning French and mathematics. Rather than believe that the solution should be increased hours of teaching these subjects, as do the political and administrative elites, it is judicious to conceive of other teaching practices.

From that perspective, interdisciplinarity becomes an interesting means to an end and not an end in itself. It is an operational means which conceives of learning environments that facilitate the students’ learning processes and favor integrating the students’ acts of learning and knowledge. As such, interdisciplinary practice is a way of pedagogically guaranteeing respect for learning methods specific to the different subject areas that make up the primary curriculum. Interdisciplinarity in education must promote the double integration by students of learning processes (different ways of learning: the processes of problem solving, of conceptualization, of experimentation, of communication, of aesthetics) and the resulting knowledge.

In this sense, school interdisciplinarity, rather than leaning towards one or the other of the four polar extremes, should be situated at the crossroads of the two continua. This would ensure a reciprocal dependency, without ignorance or predominance, among school subject areas in light of the pursued educational outcomes. It would also take into account their rich complementarities, their effective and obligatory interrelations at the cognitive content level as much as at the process level, and would recognize that all are necessary to construct human reality, to express it, and to interact with it. For these reasons we retain the following definition of school interdisciplinarity: it is the interrelationship of two or more school disciplines exercised at the curricular, didactic, and pedagogical levels, leading to the establishment of links of complementarity, cooperation, interpenetration, or reciprocal actions among diverse aspects of the curriculum (study matter, concepts, learning methodologies, technical abilities, etc.) in order to promote the integration of learning and knowledge by the student.¹⁴

To grasp interdisciplinarity in this manner first requires the conception of a curricular organization. This organization rests upon a complementarity and an interconnection of subject matters organized in groups based on a relationship to reality: the subject areas which ensure the construction of reality (human, social, natural), those which ensure the expression of this reality, and those which ensure a relationship with that reality (Lenoir, 1990, 1991, 1997). Such a structure highlights the fact that all of these subject areas rest upon learning processes (conceptualization, problem solving, communication, experimentation) which have a common scientific character and which are complementary and interdependent. In other respects, the arts program ensures simultaneously the construction of reality, its expression, and the interrelationship with that reality, but in an aesthetic mode that is different from a scientific approach.

Secondly, at the didactic and pedagogical levels, interdisciplinarity in this manner means that teachers have to develop learning situations which are associated with content from different subject areas and the required learning processes. For example, the implementation of a communication situation in French requires the student's construction of a reality in which he or she will have to communicate. Such is the function of the social sciences (history, geography, etc.) and natural sciences (biology, physics, ecology, etc.). The absence of such an indispensable link led students from the fifth grade (10-11 years) in a small town southeast of Montreal to communicate a false representation of the Amerindians of northeastern North America to students in France. They based the content of their letter on a 300-year-old anachronism,

presenting Amerindians as living in tents, traveling in bark canoes, wearing feather hats, and dressed very lightly. Aside from the fact that this representation harks back to “the little house on the prairie,” it no longer characterizes today’s or the seventeenth-century’s Amerindians. For example, the nomadic Algonquins lived in tents, but these should not be confused with the tepees of the plains Amerindians. The sedentary Iroquois lived mostly in long houses. Furthermore, to live outside at that latitude, the Amerindians had to cover themselves carefully in summer for protection against insects and in the winter against the cold. These subject-matter errors suggest that communicating in French was not thoroughly integrated with the social science subject matter to be communicated. Thus, the project was not interdisciplinary in the way we are advocating.

As we suggested earlier, the practice of interdisciplinarity needs to recognize that all along the path of learning, students resort to different but complementary processes. For example, when students plan the collection of data to construct a reality under observation, they must use a problem-solving approach (What to do in order to...?). How should an experimental procedure be conceived if the hypothesis under scrutiny does not come from previously verified knowledge? In primary school, there is often confusion between the formulation of hypotheses and the expression of opinions. An experimental design (How to verify that...?) should precede a conceptualization process (How do we know that...?).

Finally, to grasp interdisciplinarity in this manner requires that teachers examine their teaching practices and go well beyond the development of behavioral competencies and the mastery of declarative and procedural knowledge. They must strive to become conscious of their status as role models for their students and of educational outcomes which transcend the moralizing discourse and the utilitarian and technical visions of the education of a human being. Without excluding other appropriate models, we have opted for the CODA model (Lenoir, 1997), which allies the establishment of links between the contents of different subject areas and different learning processes.¹⁵ Moreover, the CODA model requires that learning situations be conceived by teachers in direct relation with human activities, i.e., with the preoccupations of human beings anchored in social life. If, as Morval writes, “interdisciplinary research is possible only around a common set of problems, in the confrontation of several disciplines about and from the same object” (1993, p. 303), interdisciplinary teaching cannot do without the “problem posing” vision of education, in the sense of Freire (1974). In both cases, such an approach investigates reality recognized as complex and orients the process

of searching for answers—that is, the search for meaning.

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Notes

1. The construct of social representations, to be distinguished from the concept of mental representation, is of European origin in the Durkheimian tradition. In the discipline of social psychology (Moscovici, 1961), the theory of social representation seeks to understand the relation between the individual and the other in relation to an object. Founded upon a social constructivist epistemology, the theory suggests that social practices are influenced by social representations.
2. The GRIFE (Research Group on Interdisciplinarity in Teacher Education) is currently engaged in a three-year research project (1997-2000) funded by FCAR (Quebec Program of Funding for Research Teams, No. 98E2859) on “The use of didactic material by primary teachers: an interdisciplinary approach.” One of the foci of the project bears upon the analysis of interdisciplinary instructional and learning material. GRIFE has also obtained another three-year grant (1998-2001) from the Social Science Research Council, Canada (SSRC, Ordinary Research Program, No. 410-98-0307) to investigate the impact on students of the ways in which interdisciplinary materials are used by primary teachers in Quebec.
3. By educational intervention we mean, in accordance with the work of Not (1979, 1987) and of Lenoir (1991), the set of finalized actions taken to achieve socially determined educational objectives in a specific institutional context. Educational intervention in the school milieu includes the planning actions (proactive phase), in-class actions (interactive phase), and the evaluation of the action (post-active phase). It is *praxis* which integrates action and critical reflection, pedagogy, and didactics.
4. In opposition to a concept which forms a “a symbolic representation made up of

characteristics common to a set of concrete representations (of objects directly observable)” (De Landsheere, 1979, p. 53), a construct (hypothetical concept or hypothetical construct) “is distinguishable (from the latter) in the sense that it is constructed, not from the observation of objects as such, but of the observations of the representations which are attributed to an object (for example, intelligence)” (p. 53). The same author defines a hypothetical construct as “an imaginary entity or model to explain certain phenomena, in order to reconnect them to a non-observable causal factor” (p. 55).

5. The Quebec school system is globally structured in the following manner: a preschool year for 5-year olds; six years of primary schooling, from 6 to 11 years old; five years of secondary schooling, from 12 to 16 years old; a collegial study period of three years for the technical sector, from 17 to 19 years old, or two years for the pre-university sector, from 17 to 18 years old; an undergraduate university study period (the baccalaureate) of three or four years depending on the area of specialization (four years, for example, for teachers and for engineers); and finally a graduate university study period made up of either professional or research masters and doctorates (mostly of research, but there are some professional doctorates). The responsibility of education lies in the provincial domain of the Canadian Federal Constitution. In Quebec, preschool, primary, and secondary schooling is placed by the State under the responsibility of school commissions which manage the schools in a given territory.

6. This case is sad because, even before the evaluation was carried out and the project was condemned by the pedagogical administrators of the school commission, it had received (for close to two years without any concrete supervision or support) the moral and financial backing of the school principal, the pedagogical administrators of the school commission, the regional directorate of the Ministry of Education, as well as the support of the educational technologies development and pedagogical research and development departments of that ministry.

7. Until recently the expression “subject matter integration” reigned unchallenged in the Quebec school context and was used as a synonym for interdisciplinarity.

8. This refers to the results of partial and non-integrated learning of concepts proper to genetic psychology and more specifically to Piaget’s development model, as presented in the context of initial preschool and primary teacher education programs in Quebec since the beginning of the 1980s.

9. To these four learning processes, which proceed from a scientific approach, one should add the aesthetic method. This method, particular to the arts, proceeds from other foundations than scientific ones. It calls upon affective, intuitive, and perceptual dimensions which differentiate it from approaches based on scientific rationality.

10. Andler (1987) has shown the term’s variety of meanings and has emphasized the necessity of a careful and clarified use of the notion.

11. Collection *Mémo* is a set of publications (school manuals, teacher guides, workbooks, etc.) which covers the six years of primary education in Quebec. The collection advocates an approach based on the integration of several subject areas, more particularly French and the social sciences.

12. The survey of the Superior Council of Education of Quebec (1982) was conducted before the curricular changes at the beginning of the 1980s. The introduction of different subject areas was left open, which explains the existence of different subjects. All of the other surveys were conducted in the framework of the application of the same curriculum. However, the Laforest (1989) survey from 1988 did not differentiate the various aspects of the arts program.

13. The space between the different subjects in the table identifies the established groups, and the dotted line represents the most important distinction between the groups.

14. By curriculum we mean “the structured set of pedagogical infrastructure, pedagogical situations, and of the interrelationships among their different components planned for an educational level and/or for a group of subjects in a school, a college, or a university” (Legendre, 1988, p. 134). In the formal sense of a prescribed course of study, Legendre defines curriculum as being “the organized set of study programs of a given level of education or of an institution, sanctioned by value units (credits) and leading to a diploma” (p. 135). The concept of didactics is used systematically in the francophone world to refer to the teacher’s relation to knowledge. Didactics are the interface between the curriculum and pedagogical practice. The concept neither defines nor prescribes a method of teaching; however, it ponders the contents of teaching, their epistemological foundations, their links to scientific knowledge or to referential social practices, their structure in an educational perspective, and proposes orientations to guide the practitioner in his/her pedagogy. A special issue of *Instructional Science* on “Didactics in the French-speaking world” was published in 1999 under the direction of François Tochon.

15. CODA means “complementary at the level of objects and of learning processes” (in French: “*complémentaire au niveau des objets et des démarches d’apprentissage*”). For a brief presentation of the model, the reader should consult Number 15 (1997, pp. 77-112) of the journal *Issues in Integrative Studies*.

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