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**CURRICULAR  
AND DIDACTIC  
CONCEPTIONS OF  
INTERDISCIPLINARITY  
IN THE FIELD OF  
EDUCATION:  
A Socio-Historical Perspective<sup>1</sup>**

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*Abstract:* Although interdisciplinary approaches to education are found throughout the West, interdisciplinarity is not everywhere conceived and implemented the same way. Adopting a socio-historical perspective, this article presents two conceptions of interdisciplinarity in primary and middle school education (though the conceptions are apparent at other levels, also), one Anglo-Saxon and American, based on the notion of curriculum, the other French and European, based on the notion of

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<sup>1</sup> This article and all of its French quotations have been translated by Joachim Lépine, university instructor and translator.

didactics. The Anglo-Saxon and American conception promotes a functional, pragmatic and utilitarian reading of interdisciplinarity that translates, in education, into a greater focus on pedagogical methods in order to promote learning processes and to address societal problems, questions, and phenomena related to the real world. The Francophone European conception for its part puts greater emphasis on the question of epistemology, on the theoretical question of the meaning of interrelationships between disciplines, and hence on the acquisition of disciplinary knowledge. To conclude, we will bring attention to the greater complementarity observed between these two approaches in education today, in the context of globalization, universalization (on economic, social, cultural, and political levels), and internationalization of exchanges. Indeed, these two approaches effectively combine the operational modes of interdisciplinary work (the “how”) with the aims pursued (the “why”) and the cognitive contents (the “what”).

**Keywords:** interdisciplinarity, education, Quebec, curriculum, *cursus*, didactics, socio-historical approach, epistemological and functional perspectives

## Introduction

Academics in Quebec working in the field of education are an unusual mix in that some completed their doctoral studies in Francophone universities of Quebec, others in Anglophone universities of Canada or the United States, and still others in Francophone universities of Europe, including Belgian, French, or Swiss institutions. After completing their studies and being hired to academic positions, they carry with them distinct cultural and scholarly traditions. Some draw on the Anglophone and American tradition, which is based on curriculum, while others draw on the Francophone and European tradition, which is based on didactics. In the dynamic that plays out in training and research, a continual but not always harmonious exchange can be seen, in programs and scholarly collaboration, between representatives of these two academic cultures. Among others, the concept of interdisciplinarity and the way it is implemented in teaching and training practices becomes an issue that leads to tensions and debates.

The objective of this article is to consider the interdisciplinary perspective that is animating the field of elementary and middle school education by examining it in light of these two cultures, cultures that also influence interdisciplinarity in higher education; one might say two academic logics, since the differences go beyond semantics. Like many other concepts in use in the field of education, the concept of interdisciplinarity is widespread in Western education systems. This does not mean, however, that it is

understood or implemented everywhere in the same way. The meaning of certain words can vary substantially depending on the epistemological position that is adopted, the psychological structure of the subject using them, and, above all, the social structures and social contexts in which they are used. It can also vary in accordance with the aims of these cultural worlds and the means chosen to achieve them. Before going further, it is important to clarify that this article considers these different educational concepts at the elementary and middle school levels, but we believe our observations have implications for interdisciplinarians working at other levels, as well.

We will use examples to describe the two concepts, namely didactics and curriculum, in order to show how they have been traditionally interpreted in the Francophone European world. This conceptual clarification also requires attention to the notions of *cursus* and program. We then show how the Anglo-Saxon American educational culture interprets the conceptions of curriculum and didactics. Finally, we show the existence of two resulting readings of interdisciplinarity. The American conception of interdisciplinarity is characterized by an operational, instrumental, and vocational approach. The Francophone conception, for its part, is characterized by a theoretical approach that concentrates on the epistemological question of the knowledge to be taught. We will especially emphasize the Francophone conception, given that the American conception is much more familiar to readers of this journal. In conclusion, we will draw attention to the way the Francophone conception has evolved, especially since the 1980s, and discuss the advantages, in our view, of conceiving interdisciplinarity in education from the standpoint of a marriage of the two cultures.

Some preliminary remarks are in order, since we are dealing with a very delicate topic. First, our intent is not to assess the merits of these conceptions. Our intent is merely to present two different ways of thinking about and implementing education, so as to understand both education systems' conceptions of interdisciplinarity. Second, this article does not pretend to describe the actual way interdisciplinarity is put into practice in classrooms.<sup>2</sup> It is concerned only with discourse, and more specifically with what is said in the literature produced in the field of education. Third, it is also important for us to emphasize that the perspective we are adopting here is undoubtedly and inevitably simplistic, as the socio-historical reality is far more complex than what can be described here. We

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<sup>2</sup>For an analysis of interdisciplinary practices in the classroom before the university level, see Lenoir and Klein (2010).

cannot take into account the full multiplicity of conceptions of curriculum, didactics, and interdisciplinarity. We are well aware that these concepts have no unequivocal meaning. Their meaning in fact depends on multiple factors related to individuals, groups and societies, be they epistemological, ontological, ideological, cultural, or of a different nature. At the risk of introducing biases, we have had to make choices which, in our view, appear to be representative of educational realities and which are based on the authors we have consulted and/or cited. Fourth, we are aware of a profound evolution in educational conceptions since the end of the Second World War. In this article we make reference to traditional conceptions that highlight the main distinctions between the two cultures, knowing full well that these conceptions have evolved, especially since the 1980s on the Francophone side. Finally, fifth, the fact that the principal author of this article is of European origin and has lived in North America for 50 years, worked with researchers from both cultures, and systematically drawn upon their various publications, does not mean that he can claim to be acculturated to one or both of these cultures. The interest of the author's situation precisely comes from the fact that he is able to provide an external, critical, and distanced point of view, while also striving to avoid over-simplifications.

## 1. Illustrations of distinct terminology

All three of us authors are fortunate to be able to participate in two different scholarly cultures, one European—in which we completed our studies—and the other North American—the university setting in which we work. This advantage allows us to compare the two educational logics that are our subject, as we will be doing in this article. To take an example, when the principal author of this article was invited by a colleague from the Free University of Brussels to teach a course to graduate students at this institution, he asked his Belgian colleague what subject he would like for him to address. His colleague answered that the author was entirely free to examine any topic of his choice, since, as he pointed out, the students would learn regardless of the course contents. Indeed, the Francophone logic relies on the educational structure of the *cursus*, which we will describe further on. The author then remarked that he could not say this in Quebec. In our part of the world, as in all North American universities, there is a pre-established course structure, that is, a curriculum, which imposes the content and guides the choice of teaching methods. This type of curricular structure

did not traditionally exist in French-speaking Europe, and has been used in Francophone countries (very infrequently in university settings) only in the last few years and to a limited extent.

Indeed, the concept of curriculum was until only a few years ago relatively little used in French-speaking Europe, while it has been a central concept for a good century in the North American and Anglo-Saxon world of education. In the 1986 publication *Curriculum Research in Europe*, edited by Hameyer, Frey, Haft, and Kuebart, the situation in French-speaking Belgium, France, Luxembourg, and French-speaking Switzerland was presented by authors who were not Francophones themselves. As Frey (1986) noted in his introduction to this collective work, the curricular tradition was customarily referred to in Francophone, Germanic, and Scandinavian countries using the terms “didactics” and “general didactics.” That is to say, although the term “curriculum” existed, those of these countries instead used the term “didactics” in various senses that we will present further in this article. In the same book, Hörner (1986) noted that the term “curriculum” was far from being accepted in France, although this did not preclude the existence of numerous approaches that were critical of *programmes d'étude* (programs of studies).<sup>3</sup> More specifically, these approaches were based on psychoanalysis, Piagetian developmental psychology, various non-directive and progressive currents, constructivist and socio-constructivist perspectives, and, of course, disciplinary didactics, and sociological currents.

The notion of curriculum can, however, be found in Francophone texts published at the end of the 20th century.<sup>4</sup> D'Hainaut (1979), a former professor at the University of Mons-Hainaut in Belgium and adherent of the neo-behaviorist approach, used the term after having read American authors during the same period, particularly Tyler (1949). In 1996 in Montreal under the direction of Dallaire and Astolfi, and subsequently in 1998 in Toulouse under the direction of Lenoir and Bouillier Oudot (2005), in the context of international gatherings held by the *Réseau francophone sur l'enseignement et la formation* [Francophone network on education and training], two symposia were held on the theme of curriculum. These gatherings brought to light that the concept was, as certain participants admitted themselves,

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<sup>3</sup> We will discuss the notion of *programmes d'études* further in the article.

<sup>4</sup> See for example Perrenoud (1984, 1994, 1997), Favre (1988), Duru-Bellat and van Zanten (1999), Kherroubi and Plaisance (2000), or Forquin (1984, 1989, 1994, 1997), and Perret and Perrenoud (1990).

relatively unknown or meaningless to French-speaking academics in Europe.<sup>5</sup>

Only in the last few years has the concept of curriculum begun to be gradually employed in Francophone Europe, with the advent of globalization, universalization (on economic, social, cultural and political levels), internationalization of scholarly and cultural exchanges, and migration of concepts from North America.<sup>6</sup> In North America, the notion of curriculum is a cornerstone, while the notion of didactics is generally not used, especially since the term is also a synonym for “pedagogy.” When the notion of didactics does occasionally appear in the academic literature, it is usually through European writers. A comparative book entitled *Didaktik and/or Curriculum. An International Dialogue* (Gundem & Hopmann, 1998) and articles by Hopmann (1992) and Hopmann and Riquarts (1995) advocate a dialogue between the two notions. A special issue of the journal *Instructional Science*, published in 1999 and edited by Tochon, for its part, discusses the notion of didactics with the intent of presenting it to American researchers.

Today, school systems on both sides of the Atlantic use many of the same terms, even occasionally including “didactics” in the United States and “curriculum” in France. It is important, however, not to be misled by these shared terms, which do not necessarily mean the same thing or belong to the same conceptual background. Sachot (2000), for example, demonstrates this when he states that, in his view, the notion of curriculum is foreign to French Republican principles<sup>7</sup> and moreover foreign to the concept of an academic discipline understood as the problematization of knowledge. For this last author, curriculum is even the counter-model of a discipline:

<sup>5</sup> See for example Anderson (1996), Burbules and Torres (2000), Coulby (2000), Forquin (2000), Lenoir (2002), Matsuura (2000), Ropé (2000), and van Zanten (2000)

<sup>6</sup> Among the French-speaking authors who have examined the issue of curriculum, we would especially like to note Forquin (1989, 1994, 1997, 2000).

<sup>7</sup> Here and elsewhere in the text, we refer to the French Republican tradition promoted by the Encyclopedic philosophers and by universalist principles. This tradition posits state guaranteed non-domination as a definition of liberty, and is built on the foundation of individuals’ ability to go beyond individual interests and adherences in order to work together in constructing an egalitarian political society. From a philosophical perspective, this Republican conception is incompatible with the individualist utilitarianism developed in the 17th century by Hobbes, Locke, etc. See for instance Macpherson (1962), Caillé, Lazzeri and Senellart (2001), and Freitag (2011).

The purpose of a discipline is primarily to guide individuals' questions about what is true, so as to enable them to make judgments and decisions "being fully informed" . . . . The logic of a curriculum is not Republican, not so much in the sense of a Republic as a specific political system but rather as an assembly of individuals. The Republic is the only authority that holds sovereignty and institutes the forms of societal organization, whether political (homeland, state, nation, etc.), economic (financial or production companies), religious, associational, etc.—it is the authority that submits all of these other internal authorities to the self-evident and universal principles imposed by reason alone, and not by any particular interest.<sup>8</sup> The curriculum is [by contrast] defined based on the expectations and needs of society, as it exists in its diversity and in its changes. (p. 25)

In the Francophone tradition of education, it is customary to organize learning in primary, middle, and high school according to the logic of a *cursus* rather than a curriculum, as we are going to explain in the next section. The abandonment of the notion of *cursus* and the introduction of the interdisciplinary perspective have given rise to numerous and heated debates, particularly in France. We will present these debates further along in the article. However, we would like to present an example here. We have been invited over the years to participate in summer university programs on the theme of interdisciplinarity, which the French government wanted to introduce in primary and secondary education. On these occasions, discussions did not deal with the means by which to operationalize interdisciplinarity in education. For the most part, they bore on the relations to be established between educational disciplines, the place of cognitive contents, and the need to preserve disciplinary specificity. In 2000 we also organized an international colloquium on interdisciplinarity in education bringing together researchers from Europe as well as North and South America. The event led to major theoretical confrontations prompted by

<sup>8</sup> From this French Republican perspective promoted by Sachot (2000), the aim of the school system is to open the mind, to foster the use of reason and to emancipate human beings, independent of any utilitarian aim. As we will see further on, this emancipation is achieved through the acquisition of disciplinary knowledge, with the support of reason.



the French academics, indicating a distinct understanding of interdisciplinarity and of its implementation. While the Francophone European researchers debated the relevance of implementing interdisciplinarity, the hierarchy of the academic disciplines,<sup>9</sup> and the impact of interdisciplinarity on the epistemological foundations of these disciplines, Americans Julie T. Klein and Gordon F. Vars, contrastingly, presented in a few systematic points the operational modes to use in order to implement an interdisciplinary approach in education.

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<sup>9</sup> In the Francophone tradition, the academic disciplines are designated using the term *disciplines scientifiques*, which encompasses all the disciplines that make up the system of the sciences. This includes the natural sciences (biology, chemistry, physics, etc.), mathematics, and the humanities and social sciences (history, geography, etc.). Stichweh (1991) has shown that disciplinary differentiation can be traced back to the system of the so-called sciences that progressively became established in the 18<sup>th</sup> century, in opposition to a model based on knowledge produced and controlled from the outside. The previous model had been based on erudition as a common form of knowledge and as a mode for organizing, preserving and exposing this historically accumulated knowledge: “[T]he differentiation of the disciplines . . . is . . . a mechanism for systems’ self-organization that replaces organizing interventions from the outside” (p. 21), essentially the interventions of the Church and then the prince. These scientific disciplines can be found in the form of *disciplines scolaires* (school disciplines) in the education system. It is worth mentioning that the school disciplines are not scientific disciplines. As we have shown based on numerous French and English speaking authors (Lenoir & Hasni, 2006), the school disciplines essentially come from four sources: some are extensions of the scientific disciplines (examples: mathematics and chemistry); others are a result of societal issues (examples: languages and morality); some are a product of the history of schools (example: grammar); and still others stem from interactions between society, school and scientific knowledge (examples: geography and ecology). In all of these configurations, the school disciplines contain varying quantities of elements that are not scientific knowledge, such as values, political orientations, etc. In addition, because they come under a logic of transmission rather than a logic of research, the school disciplines are characterized by contents that are “congealed” (frozen in time) and often simplified. Finally, it should be noted that the Francophone world distinguishes between object-disciplines, taught disciplines, and contributing disciplines (which shed light on, support and enrich the object-disciplines). The contributing disciplines include epistemology, sociology, psychology, anthropology, etc. On the notion of discipline itself, see for example Heckhausen (1972), Flexner (1979), Klein (1990, 1996), Stichweh (1991), Messer-Davidow, Shumway and Sylvan (1993), Weingart (2010), Repko, Szostak and Phillips Buchberger (2014).



## 2. Conceptual clarifications

In order to consider the interdisciplinary perspective in the field of education from the curricular and didactic perspectives, we must first begin with a few conceptual clarifications.

### 2.1 *Cursus*, program, and curriculum in Francophone culture

French-speaking Europe has traditionally used the notion of *cursus* (Charlot, 1995), a term of Latin origin that refers to the idea of a race, a brisk walk, a trail that is followed, or a trip or journey (Goelzer, 1928). Academically speaking, the idea of *cursus* refers either to a vocational program considered as a set of steps to complete, or to a cycle of studies pursued in a given discipline during a specific time frame and attested by a diploma. An academic *cursus* is characterized by an accumulation of courses, that is, a succession of subjects and contents that are distinct and not explicitly and formally connected to each other (Forquin, 1984).

This Francophone conception essentially considers an educational *cursus* to be a whole of disciplinary contents, that is, a pluri-disciplinary structure whose components are deemed to be complementary. This pluridisciplinary structure is made up of *programmes d'étude* (programs of study) or “syllabi” established on a largely autonomous disciplinary basis. Each program merely lists the contents of the school subject to be taught, leaving out all the other aspects that could be considered—learning objectives, pedagogical approaches, suggested activities, evaluation-related aspects, etc. These other aspects are the prerogative of the teacher or administrative prescriptions. This “Encyclopedic” conception, which prevailed up to the end of the 1960s, was somewhat modified later on with the introduction of learning objectives.

While the *cursus* is conceived as a succession of cognitive contents within programs that are autonomous, but considered (rightfully or not) to be complementary, the Francophone interpretation of the notion of curriculum is frequently confused and used with the same meaning, because it has often been likened to a *programme d'études*, an outline of study objectives, as demonstrated by Favre (1988). This is the logic that led our colleague from the Free University of Brussels to give the principal author of this article full freedom in determining the course contents he wished to teach.

In a doctoral thesis dealing with the concept of curriculum, Durand (1994) suggests that

in the Francophone world, the way education and teaching programs were defined was generally dictated by the government, in the form of programs of study. Examining the theory and practice of these programs proved futile or even inconceivable. As a result, the distinction between curriculum and program was made only by specialists who were familiar with the American research on the subject. (p. 72)

This interpretation, as interesting and valuable as it may be, does not appear sufficient in our view. Indeed, other factors, both epistemological and socio-cultural, are at the root of this distinction between curriculum and program. For reasons that we will discuss, in Anglophone education the term “curriculum” encompasses the premise of the subject’s societal integration (both in its individual and societal versions, in the writings of Tyler as well as Dewey), while in the French-speaking world, the *programme d’études* is essentially focused on the object, in this case the contents to be taught. To put it briefly, in the Francophone logic, a *cursus* is made up of a succession of *programmes d’étude*, in other words, it contains only a list of contents associated with the discipline at hand (mathematics, history, biology, etc.), but does not address broader issues of societal integration.

Of course, as the premise of Geoffroy (2003) clearly shows, we are currently seeing an “expansion in the sense of the term ‘curriculum’” (p. 78) among Francophone specialists. Geoffroy shows that “it would be wrong to say that the term now boils down to the idea of a *programme d’études* in the Francophone field of education” (p. 78). Interpretations, however, most often remain marked by the educational cultural tradition of Francophone Europe, particularly in France. We have, for example, already mentioned the French Republican response of Sachot (2000). Perrenoud (1994), a Swiss researcher, considers that the concept of curriculum has not historically been associated with academic dimensions: “in Anglo-Saxon countries, ‘curriculum’ is used to designate the educational pathway proposed to learners, while in French one is more likely to refer to a *plan d’études*, *programme* or *cursus*, depending on whether one wishes to emphasize the progression of knowledge, successive contents or the structure of the student’s career” (p. 61). “Paradoxically,” he adds, “it is the notion of hidden curriculum that gives the concept its status in the humanities and social sciences” (p. 61) in the sense that the curriculum does not encompass everything that is taught at school. For their part, Duru Bellat and van Zanten (1999) define curriculum

as “all of the pedagogical situations experienced by a ‘learner’ over a given *cursus* in the context of an educational institution” (p. 130). Although they may see the curriculum as being more than an educational *cursus*, in practice they insist on its function of delimiting cognitive contents, thereby relegating know-how and the social implications of learning to a vague socialization<sup>10</sup> that mainly takes place within the family. In short, the authors we have just cited interpret the notion of curriculum as coming under the Francophone logic of the *cursus*.

## 2.2 Curriculum according to the Anglo-Saxon logic

According to a French dictionary of Latin (Goelzer, 1928), the term “curriculum” comes from the Latin *currere* meaning to run, to go quickly. The word “curriculum” in Latin refers to the action of running or racing on foot, by horse or by chariot (*currus* means race chariot, war chariot or triumphal chariot). Basic to all of this is the existence of a finalized route to be swiftly covered by a human being. The route is undoubtedly fraught with difficulties, obstacles, and distinct components, but above all it is laid out in advance, an idea absent from a *cursus*. It forms a whole in which all of these components will lead, once completed, to the end of a journey, at which point these components will be interrelated and integrated. It is mostly in this general sense, which is close to that of the Latin *cursus*, that the term is used in the United States. However, the notion is loaded with other meanings in the field of education.

Indeed, the concept of curriculum has had a long history in the United States since the mid-19th century and has been assigned multiple meanings. D’Hainaut (1979), drawing inspiration from American journals to examine curriculum, points out that “Siegel noted twenty-seven different ways that the word ‘curriculum’ was defined or characterized in the literature” (p. 83). There are in fact hundreds (Pinar, Reynolds, Slattery & Taubman, 1995),

<sup>10</sup> Berger and Luckmann (1966) distinguish between primary and secondary socialization: Socialization is an “ontogenetic process . . . that can be . . . defined as the individual’s consistent and ongoing installation within the objective world of a society or a sector thereof. Primary socialization is the first socialization that the individual undergoes during childhood, thanks to which he or she will become a member of society. Secondary socialization consists of any subsequent process that allows the already socialized individual to be integrated into new sectors of the objective world of society” (p. 179). In the Francophone logic, primary socialization is first and foremost the responsibility of the family and not the school.

according to other currents of thought, although the nuances are sometimes very subtle. Forquin (1989), among many others, points to the wide diversity of ways the term is used in English. Short (1986) and Jackson (1992) recall the confusion about the concept, with the latter mentioning some twenty other academics who have condemned the terminological hodgepodge. Connelly and Clandinin (1988) note the difficulty of making sense of this multiplicity of definitions. Goodlad (1979) expresses impatience with nuances that he considers sterile. Pinar, Reynolds, Slattery and Taubman (1995) for their part observe that “the field may always be cacophonous” (p. 867).

Although in school systems what is referred to is the explicit, prescribed, official, and formal curriculum, it is important to underline that the American research has added various qualifications to the concept of curriculum in order to distinguish between its different forms. In the North American academic literature one finds, for example, the following denominations, some of which have been subsequently used in French-speaking Europe: explicit curriculum, formal curriculum, open curriculum, needed curriculum, desired curriculum or delivered and received curriculum (Venezky, 1992), i.e., the actual curriculum as implemented by teachers and received by students, and many other distinctive forms of the curriculum, including hidden (Jackson, 1968), implicit or null (Eisner, 1985), unstudied (Overly, 1970), unwritten (Dreeben, 1976), true (Berman, 1987), etc. Pinar, Reynolds, Slattery and Taubman (1995) conclude, following Jackson (1992), that these designations represent an interesting conceptual variety and that making sense of them requires an understanding of their discursive structure and of the intentions behind them.

The evolution of the concept of curriculum in the United States has in no way been linear. Rather than conceiving the history of the concept of curriculum in this country using the metaphor of a long and quiet river running placidly to its estuary, Munro (1998) maintains that its flow has been fraught with turbulence and clashes, churning up considerable tension and debate. A number of American authors<sup>11</sup> have traced the historical path of the concept of curriculum since the British colonial empire and especially since the concept emerged in the mid-19th century under the influence of Herbert Spencer and Herbartian thought in particular. The intent here is not

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<sup>11</sup> See Cremin (1955, 1964, 1970, 1971), Rudolph (1977), Franklin (1986), Kliebard (1986, 1988, 1992a, 1992b), Schubert (1986), Kridel (1989), Glanz (1990), Hamilton (1990), Tanner and Tanner (1990), Willis, Schubert, Bullough, Kridel and Holton (1993), Pinar, Reynolds, Slattery and Taubman (1995).

to retrace the evolution of this notion in American education over the 19th and 20th centuries. Pinar, Reynolds, Slattery and Traubman (1995) discuss conceptions of curriculum at length from a historical standpoint, from 1828 to 1979, and then contemporary debates on the topic between 1980 and 1994, from various conceptual angles. They note that many other authors have also sought to map different conceptions of curriculum in education. Pinar (1998a) points out the concept's Balkanization, while Flinders and Thornton (1997) mention divergent points of view. Doyle (1992) shows how much the conception of curriculum has evolved in education. Indeed, as he states, "curriculum theory evolved in two directions" (p. 492). The first separated the concepts of curriculum and pedagogy, narrowing curriculum to the contents to be taught.<sup>12</sup> This is the "traditional purview of philosophers and specialists in academic disciplines" (p. 492) who are interested only in the question "What knowledge is of most worth?" (p. 492) The second direction of curriculum theory in American education involved connecting pedagogy with the way the curriculum is administered.<sup>13</sup> This direction promotes a close relationship between the curriculum and questions relative to its implementation, to the activities it requires, to learning assessment, etc. Kliebard (1992b) makes the same distinction, but while taking a critical look at the weaknesses of various conceptions of curriculum in education. Over and beyond all of the debates and trends on this subject, and with no pretension of overcoming controversies or being exhaustive, we subscribe to the second perspective, because it is representative of contemporary education in American or Anglo-Saxon practice. The notion of curriculum includes "a plan for a quality teaching and learning process" (Pratt & Short, 1994, p. 1320) and constitutes a cultural artifact, in that it is a text profoundly marked by the culture of a society at a given time in its history (Ratcliff, 1997).

Davis, in *Interdisciplinary Courses and Team Teaching* (1995), also considers that "the root question" (p. 26) of a curriculum, "once knowledge has been generated, [is] what is the best way of transmitting it?" (p. 26) Forquin (1989), a specialist on curriculum in Anglo-Saxon thought, writes that "in the Anglo-Saxon education vocabulary [curriculum is] an

<sup>12</sup>Tanner and Tanner (1995) note that "Traditionalists continued to see the curriculum as a distillation of the cumulative tradition of organized knowledge, or as synonymous with the course of study" (p. 189).

<sup>13</sup> The relationships that develop between curriculum and pedagogy in no way mean that we consider these two concepts to be synonyms. Curriculum includes components of pedagogy, but cannot be reduced to it.

educational path, . . . a seamless whole of learning experiences to which the individual is exposed over a given period in the context of a formal educational institution” (pp. 22-23). Curriculum therefore encompasses the official text<sup>14</sup> (prescribed curriculum), as well as various kinds of prescriptions and/or suggestions for its implementation in the classroom. The concept of didactics in its European sense consequently appears to be superfluous to Americans, since the curriculum is viewed as referring to the educational process as a whole—including didactics in the specific sense of pedagogy. According to Kliebard (1992*a*), one of the main American authors to examine the conceptualization of curriculum, curricular theory aims to give coherence to the conceptual structuring that answers the question, “What should we teach?” (p. 202) Kliebard pinpoints the issues inherent to curricular theory based on three questions: First, what must be taught? Second, to whom is instruction addressed and what is taught to whom? And third, how should it be taught? This last question, in his view, is the most important, since it deals with the pedagogical means.<sup>15</sup>

As demonstrated for example by the writings of Kliebard (1986, 1992*a*, 1992*b*) and Pinar, Reynolds, Slattery and Taubman (1995) concerning the history of the American curriculum, the concept of curriculum goes beyond a sole concern for knowledge. In the United States, since the curriculum is “understood as an oriented structure of contents stemming from a socio-political choice of educational aims, goals and objectives” (Alberty & May, 1987, p. 319), the focus is on the way learning is organized with a view to forging a human being. The concept of curriculum is accordingly based on a vision concerned with integrating individuals into society by inculcating socially promoted values and symbols.

In sum, beyond the cognitive contents, the American concept of curriculum is based on pragmatic dimensions in order to impart the know-how that students need: “[T]he school curriculum is presumably designed not only to inculcate each member of the rising generation in the best elements of knowledge, systematically organized or codified since the

<sup>14</sup> We borrow the term from Pinar, Reynolds, Slattery and Taubman (1995). These authors distinguish between nine “categories of contemporary [reconceptualist] curriculum discourses” (p. 43): political text, racial text, gender text, phenomenological text, poststructuralist/deconstructed/postmodern text, autobiographical/ biographical text, aesthetic text, theological text, and institutionalized text.

<sup>15</sup> We would like to reiterate that we are well aware of the debates and oppositions between specialists in different scientific and academic fields, which have been abundantly illustrated by Pinar, Reynolds, Slattery and Taubman (1995).



dawn of civilization, but to enable each member of the rising generation to utilize that knowledge to improve the life of the individual and the life of society” (Tanner & Tanner, 1995, p. 189). Tanner and Tanner refer to Dewey (1964), who conceives “education as a generative process—that is, a process through which the learner extends and deepens the capability of exercising intelligent control over changing conditions of life” (p. 189).<sup>16</sup> Today, even if there is no consensus on a definition of curriculum, the curriculum is thought about from a pragmatic point of view as involving an evolutionary process, as an instrument that is constantly under development and that needs to meet the needs of the times and adapt to contexts, requirements and constraints (Pinar, 1998a; Pinar, Reynolds, Slattery & Taubman, 1995; Tanner & Tanner, 1995): “[H]ence, in terms of the aims of the school system, a close relationship has been gradually established between a pragmatic and instrumental vision (know-how), on one hand, and a concern for social integration and for adhesion to the norms and values that characterize American thought (personal skills), on the other” (Lenoir, 2002, p. 103). In addition to this pragmatic vision, to which we will return in section 2.4, it is important to mention the importance of personal skills that are geared toward civic education. Human liberty, as enshrined in Jefferson’s *Declaration of Independence*, is primarily achieved through socialization, understood here as the development of know-how and personal skills. That which provides liberty is not directly related to knowledge, but the ability to act in and on the world as a citizen. Educating then means equipping students in a dual sense, namely that of practice (know-how) and that of citizenship (enabling human and social relationships as equal members of the nation-state). The U.S. Congress accordingly voted in 1994 on the Goals 2000: Educate America Act, which

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<sup>16</sup> Noddings (2013), who takes up the title of Dewey’s book but inverts the two nouns (*Education and Democracy in the 21st Century*), largely bases himself on this last author in order to take a critical look at the current directions of the American education system, namely “the current move to convert curriculum content into content standards” (p. 147), “the current emphasis on standardized tests” (p. 153), the “dominantly business talk” (p. 155), etc. In contrast to these directions, “rejecting the notion that schooling should concentrate on intellectual development academically conceived, we should design programs that support satisfying ways of life for whole persons in all three of the great domains [personal, civic, and occupational]” (p. 157). He promotes the idea that education should focus on cooperation with a view to developing a fully democratic citizenship.

established eight national goals for education. Two of those goals dealt specifically with civic education. The law specifies that students will “leave grades four, eight, and twelve having demonstrated competency over challenging subject matter including ... civics and government ... so that they may be prepared for responsible citizenship.” The Educate America Act also charges schools with seeing that all students are “involved in activities that promote and demonstrate ... good citizenship, community service and personal responsibility.” To achieve these goals, schools address citizenship in both the formal and informal curriculum. (StateUniversity.com Education Encyclopedia)<sup>17</sup>

In short, unlike the European concept of *cursus*, the American concept of curriculum conveys, first, the idea of continuity and close relationships between its component parts. Second, it is also seen, from an educational standpoint, as being closely related to pedagogy, understood as various types of modes (organizational, relational, psycho-affective, etc.) to implement in order to provide appropriate instruction. Third, it promotes a focus on the “how to,” that is, practical training for employment. Fourth, in the concept of curriculum, civic education is considered to be the key know-how, i.e., the basis for social unity.

### 2.3 Didactics in the Francophone and Anglophone worlds

Although the words “curriculum” and “didactics” often have a similar definition in non-specialized dictionaries, the Anglophone educational research rarely uses the term “didactics.” Most often, it is employed in a pejorative sense to refer to a dull and old-fashioned teaching practice. An exploration of ERIC databases points to the existence of 1,683 publications dealing with didactics in English over the past 20 years, 990 of which are in connection with education, including 579 written by American authors. More subtle statistical analysis reveals that, for example, in these years only 25 publications from the United States addressed teacher education, 46 primary and secondary education, etc. In short, even though the notion

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<sup>17</sup> The complete version can be consulted at <http://www2.ed.gov/legislation/GOALS2000/TheAct/index.html>.

of didactics is present, it is very far from rivaling that of curriculum in the degree of attention it has attracted from scholars. For the same period, the concept of curriculum appears in a total of 68,272 entries in ERIC, and 14,861 when the term “academic” is added (2,177 entries, most of which are published by researchers in education: 931 in elementary education and 1,246 in secondary education). In addition, the *Merriam Webster Dictionary* connects the sense of the adjective “didactic” to pedagogical activity. It also assigns “didactic” a sense of education as opposed to entertainment. In contrast, the Francophone world makes a radical distinction between didactics and pedagogy. It places great value on didactics, which is a central notion in the Francophone field of teacher education and educational research. For the same period (1995-2014), the largest Francophone database, Francis, reported 1,802 publications, including 40 books. Our own database at the CREAS and CRCIE (in Quebec, Canada) shows almost 500 books on didactics, even if there are very few recent and exhaustive reviews of the literature on this particular topic, which indicates the absence of any recent and exhaustive reviews of the literature.<sup>18</sup> Without exception, all of the publications (books or academic articles) in the field of education in the Francophone world (French-speaking Belgium, France, Luxemburg, Quebec and French-speaking Switzerland) that deal with the teaching of school disciplines or teacher education for these disciplines mention the concept of didactics. As for curriculum in the Francophone world of education, the same database (Francis) identified only 11 documents, while the database *Érudit* identified 98. In both cases, almost all of the publications in question were published in 2006 or later. We estimate that only a dozen or so French-language books have dealt with curriculum since 1995. Most of these books, it is important to mention, interpret the concept of curriculum in reference to the concept of *cursus*.

In Francophone Europe, very roughly speaking, curriculum today is used to refer to the structuring of various disciplinary programs of study, while disciplinary didactics deals with the treatment of each of these programs’ cognitive contents. The issue of didactics and didactic research in education, when compared to that of curriculum and pedagogy,<sup>19</sup> is overall quite

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<sup>18</sup> A 1993 guide entitled *Guide bibliographique des didactiques*, edited by Desvé, presents more than 1,200 publications on didactics, primarily by French authors, that were published since the term’s emergence in the French-speaking world in 1970.

<sup>19</sup> The term “pedagogy” is quite old in the French language, as it first appeared at the end of the 15th century. In French, it has many meanings, including education science (a now outdated conception), philosophical or psychological doctrines (negative, non-directive, traditional and other pedagogies), educational movements

recent, in any case in contemporary debates in French-speaking Europe. Francophone didacticians traditionally identified with their distant founding father Comenius (1592-1670) and his *Didactica magna*, or with Ratke (1571-1635), the author of an even an older but less well known book, the *Methodus didactica*. But when searching for a distant origin and remaining bound to the word itself, is there not a risk, as Benvéniste (1969) for example has pointed out in *Le vocabulaire des institutions indo-européennes*, of committing an anachronism leading to major semantic confusion and especially obscuring related social issues? Indeed, the introduction of the term “didactics” in the educational discourse of the 17th century expressed a desire for profound social transformation<sup>20</sup> in a time which, for Czechs but also many other Europeans, could be described as an “age of darkness” (Denis, 1994). At this time, to paraphrase Servier (1967), the Horsemen of the Apocalypse (religious wars and the plague) were revisiting Europe.

In the traditional Protestant perspective (as well as in the Catholic conception, for that matter), the constitution of the human being is determined *a priori* by the divine order as the master and measure of all things. The human being is merely the instrument working to the greater glory of God in order to achieve salvation. To understand the Francophone conception, it is important to keep in mind that the French Revolution of 1789 had roots in rational Cartesian thought, in philosophers, and in the Encyclopedists. During the Enlightenment, these currents of thought progressively became opposed to the obscurantism, ignorance and social oppression which, in their view, characterized the Catholic Church, the royalty, and the aristocracy (Charlot, 1987; Éliard, 1994; Kintzler, 1989; Lelièvre, 1994; Léon, 1971).

(the new school, the *arbeitsschule*, etc.), theories (behaviorism, cognitivism, etc.), and so on. Here, inspired by Gersten, Baker, Pugach, Scanlon and Chard (2001), we use the term in the sense of the means to implement in order to facilitate the cognitive learning process.

<sup>20</sup> It is worth recalling that Comenius belonged to the Protestant movement of the Moravian Brothers, which associated with Hussite doctrines. During the Thirty Years' War, under the threat of the Catholic Spanish troops, he was forced to flee his country and abandon his wife and children, who died of the plague. He subsequently had to flee Poland, and ultimately found refuge in Amsterdam. Modern French language research (for example Cauly, 1995; Canavolas and Bibeau, 1996; Denis, 1994) emphasizes the importance of his work in two regards: its revolutionary nature, which, in Comenius' view, stood up to Catholic conceptions; and its visionary nature, which defended the establishment of a universal rational science.

With the replacement of the divine power by the secular state, the concept of didactics asserted human beings' control over knowledge, its teaching and its learning. In the French Republican spirit, knowledge, supported by reason, is the source of human liberty and the best guarantee for creating a free citizen.

In the older Germanic, but also Scandinavian tradition,<sup>21</sup> the conception of didactics is profoundly different from the Francophone conception. It is conceived either as “the establishment of learning conditions in terms of psychological development” (Hellgren, 1993c, p. 10), or as a methodology for teaching<sup>22</sup> (for example, Wallin, 1988; Engelsen, 1990; Gundem, 1992; Klafki, 1998). This, especially in Germany, classes it as a “general didactics” (*allgemeinedidaktik*) “that is clearly part of the education sciences and concerns all teaching and learning problems from a general standpoint, independent of the disciplines and contents” (Dorier, Leutenegger & Schneuwly, 2013, p.12). This German concept of *didaktik* is thoroughly rejected by French didacticians, who only think in terms of the didactics specific to each discipline, hence the use of the plural: *les didactiques des disciplines*. It is important here to explain the origin of this exclusively Francophone conception before defining and characterizing it.

According to Dorier, Leutenegger and Schneuwly (2013), the concept of didactics was reintroduced in the Francophone world some forty years ago as a result of three main factors that differ from those in the 17th century. The first two were institutional, while the third was socio-educational and cultural. The emergence of disciplinary didactics as a disciplinary field stemmed, first, from the massification of secondary education starting in the 1950s. The increase of students led to a profound overhaul of *plans d'études* for all school subjects, then to a reform of teacher education. Second, the elimination of normal schools in order to

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<sup>21</sup> A number of English-language texts describe the didactic conceptions of education researchers in these countries. See Wallin (1988), Engelsen (1990), Hopmann (1992), Gundem (1992, 1995), Westbury, Doyle and Künzli (1993), Hellgren (1993a, 1993b), Hopmann and Riquarts (1995), Klafki (1995), Gundem and Hopmann (1998), Englund (2006).

<sup>22</sup> In other countries, for example in Brazil, didactics is often defined either as an educational methodology or as pedagogical processes. See, for example, Passos Alencastro Veiga (1988, 1995, 2002). However, it is also understood today as an educational theory that involves an epistemological and political dimension (Libâneo, 1990, 2013).

“universitarize” teacher education<sup>23</sup> prompted a need for cooperation between different teaching professionals in the university context, leading to the production of “academic disciplines that connected research and teacher education” (p. 10). The third factor was a reaction against theories and practices which, without forgetting the knowledge objects to be taught (an impossibility, as Astolfi [1997] and Houssaye [1997] point out) somewhat neglected them under the inspiration of currents focused on “early-learning activities.” These currents had in turn challenged the earlier “didacticism” (in the American sense of the word) of traditional teaching methods and their underlying conceptions of learning. The reaction in the 1970s was mainly against the greater importance that early-learning activities placed on pedagogical aspects, which was seen as minimizing the importance of learning the cognitive contents of various disciplines at school.<sup>24</sup>

The third factor is critical. Indeed, as Develay (1997), Raisky (1996) and Schneuwly (1990) for example, point out, the re-creation of the word “didactics” and its powerful resurgence in the field of Francophone education show a critical and challenging posture that could be likened to the Comenian attitude. Around the 1970s, the first Francophone didacticians

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<sup>23</sup>This “universitarization” first took place in Quebec starting in 1969. At that time, all credited instruction for teaching at the primary and secondary levels, whether initial or ongoing, began to be provided in education faculties by research professors who were required to hold a doctorate. For its part, France created *Instituts universitaires de formation des maîtres* (IUFM) in 1991, which became *Écoles supérieures du professorat et de l'éducation* (ESPE) in 2013. Switzerland and Belgium created *hautes écoles universitaires*, respectively in 1990 and in 1995. All of this teacher education is aimed at professionalizing teachers and is based on a competency-based framework.

<sup>24</sup>The opposition was mainly against currents of the active school, on one hand, and against pragmatic conceptions promoted by early-learning activities, on the other. The latter were primarily inspired by the Herbartian movement, then by Dewey, as well as the humanist school with Rogers, Bany, Johnson, etc.—from the United States, but also the “New School” (Montessori, Freinet, Decroly, etc.) and open pedagogy. From the point of view that developed in France at this time, but also in Quebec, early-learning activities conceived the school as a “community” where education was focused on matters of everyday life and on life experiences, as well as on activities seeking children’s fulfillment. The accusation was clear: Schools were no longer teaching students, disciplinary knowledge had been forgotten, and schools were contenting themselves with shifting the focus to individuals and their fulfillment as human beings. In other words, too much socialization, not enough instruction.



adopted an orientation towards profound change in the conception of the teaching-learning relationship, even if this change was based on very different motivations than the political and religious Comenian motives. For Comenius, didactics assuredly led to a progressive position because of its concern for promoting more “democratic” and emancipatory education that drew on Hussite tradition (Capková, 1992; Delumeau, 1965). This tradition was aimed at realizing a doctrine of profound engagement in society (Garin, 1968). In the Francophone world, at the start of the 1970s, the first researchers who brought the question of didactics back to the table maintained its “combative and critical nature” (Schneuwly, 1990, p. 217) and wanted to reaffirm the importance of academic knowledge and of its cognitive appropriation as emancipatory dimensions in education, in the Francophone Republican tradition. They also wanted to reassert the profoundly dialectical nature of the teaching-learning relationship, which required a change in epistemological and psychological perspective. The neopositivist and neobehaviorist postures that were dominant in the 1950s up through the end of the 1970s in the Francophone world gave way to psychological and epistemological conceptions tending toward constructivism. Instead of conceiving knowledge as pre-existing, given *a priori*, and embedded in written discourse and especially textbooks, Francophone didacticists adopted another conception stemming from the dialectical tradition. The new conception stressed the fundamental process of a historically and spatially dated social production of reality. Knowledge came to be viewed as a temporary and limited product of human and social action in context that expresses a symbolic representation of the real world. Morf, Grize and Pauli (1969) and Morf (1972), disciples of Piaget, are perhaps the first to have emphasized this dialectical perspective to which didacticists lay claim. Morf, Grize and Pauli (1969) propose “a general theory of interventions on thought and its operation” based on three interrelated areas: a psychological area, relative to the subject; an epistemological area, relative to the knowledge object; and a logical area “that must enable analysis of the relationships involved in the implementation of suitable strategies” (p. 25), relative to the teacher. This new orientation, which was encapsulated by didactics, was initially (in the 1970s and 1980s) put forward by mathematicians who were promoting the teaching of “New Mathematics.” Linguists, who were interested in developing French didactics based on linguistics (in a time dominated by structuralist thinking in France), soon followed suit. Researchers in all of the other educational disciplines subsequently joined the movement.

How, then, might disciplinary didactics be defined? Although many definitions exist, it is possible to identify characteristics that are widely shared by the community of didacticians and, more broadly, by the community of researchers in education. Disciplinary didactics are research disciplines “that analyze contents (knowledge, know-how, etc.) as objects of teaching and learning” (Reuter, 2010, p. 69) and as they exist in the academic disciplines. As a result, didactics can be radically distinguished from the other disciplines in the field of education, namely

- those that analyze contents but without dealing with teaching or learning (for example, mathematics, linguistics, biology, history, etc.);
- those that analyze teaching or learning but without dealing with the contents (for example, pedagogy, philosophy, sociology, educational psychology, etc.). (p. 69)

Disciplinary didactics can therefore be understood as the problematization of the knowledge contents that are needed to achieve educational aims. For each discipline, it examines the problems of producing knowledge, varying cognitive contents, organizing and selecting the school knowledge to be taught, and arranging the knowledge in order to respect students’ abilities. It raises questions about the very nature of the discipline in question, its epistemological contours, and the meaning of the cognitive contents to be taught. Furthermore, it reflects on the arrangement of these contents, still from a cognitive standpoint, to make them accessible to students. In other words, disciplinary didactics studies the phenomena involved in the circulation of disciplinary knowledge, and it theorizes each educational discipline’s educational phenomena. Based on Margolinas (1993) and many other didacticians, it can be defined as a research discipline that is rationally founded on a sound epistemological and theoretical basis. It is centered on the study of exclusive cognitive contents—those of each discipline in its (perceived) indispensable autonomy—and proposes educational situations only insofar as they have been validated by rigorous experimental control using didactic engineering. In sum, conceiving didactics requires the establishment of indissociable interactions between the components of the larger system to which it belongs.

Disciplinary didactics<sup>25</sup> accordingly should not be confused with

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<sup>25</sup> Didacticians are university professors who teach the didactics of an academic discipline (mathematics, biology, physics, history, geography, literature, linguistics,

the teaching and learning practices in each school discipline, with prescriptions resulting from laws or official directives, textbooks, etc., or with recommended educational practices from various sources (inspectors, pedagogical advisors, associations, teachers unions, etc.). It is distinct from pedagogical approaches, which are the province of researchers in pedagogy: “[Disciplinary didactics] must therefore struggle to distinguish itself on at least two fronts: with regard to pedagogy and with regard to the major academic disciplines” (Dorier, Leutenegger & Schneuwly, 2013, p. 16). It is based on a general conceptual structure that is fairly widely shared by the community of didacticians (including transposition, devolution, the theory of didactic situations, reference practices, the tripolar model, etc.). For example, didacticians subscribe to a general reference model known as the “didactic system.” This system consists in the interaction of three sub-systems, that is, the didactic relationship between the subject (the students), the object (the educational contents), and the teacher. It is rooted in a long philosophical and epistemological tradition.<sup>26</sup> This understanding of the didactic system—which, like all models, is somewhat simplistic but can be a useful conceptual guide—is based on a “tripolar” dialectical vision of interaction between three basic elements, rather than on a traditional and causal vision of interrelationships between two elements. To give another example, the concept of transposition involves arranging scholarly knowledge as school knowledge in such a way as to make it understandable to students. This common conceptual structure is, however, interpreted and reorganized by each didactics depending on the particularities of the discipline at hand.

## 2.4 Curriculum and didactics: what sets them apart

In the very broadest of terms—for the subject would merit conceptual and socio-historical development, as well as nuance—to understand the reasons leading to this difference in paradigm on an educational level between

etc.). After studying their discipline, they obtain a doctorate in the didactics of their chosen discipline. Like all university professors, they are required to do research related to their university teaching.

<sup>26</sup>The system’s main influences are Piagetian (Piaget, 1967, 1971), but today they are increasingly Vygotskian and Hegelian. Its contemporary foundations can mainly be found in Hegel, Marx, Piaget (Lenoir, 1993, 1996, 2014), but also Moscovici (1970) and Habermas (1973, 1976), for example, and later in Le Moigne (1984) and Morin (1977).

Francophone Europe and Anglophone North America (Lenoir, 2002), the following guideposts are worth mentioning. In the United States, as a result of a tradition that flourished in the second half of the 19th century, the curricular conception focused on the implementation of teaching practices and on pedagogical questions (the “how to”). As we have seen, this is explicitly shown by Kliebard (1992*a*), for whom the operational modes are a priority. Following the Civil War and with the wave of unbridled industrialization, there emerged a new model spearheaded by Whitehead (1929), among others (Boix Mansilla & Lenoir, 2010; Lenoir, 2002). This new model, which could be described as pragmatic, was centered on know-how. The American citizen would become realized through action, by doing. This “vocationalist” conception, in the sense of “professionalizing,” is characterized by education founded on the development of skills deemed to be useful to meet the needs and expectations of society. As Pinar (1998*b*) explicitly states, “[t]he American public schools were created over 100 years ago to prepare citizens for jobs in an industrial economy” (p. 205). This represents a reversal in educational conception inasmuch as the progressive movements (Parker, Quincy, Ward, Herbartians, Dewey, etc.) opposed traditional humanist conceptions which, for their part, advocated “a non-utilitarian, cultural and academic education” (Rudolph, 1977, p. 14) stemming from the traditional cultural and humanist British conception of education whose iconic figurehead was Cardinal Newman (1852/1907; 1872/1909).

In contrast, in French-speaking Europe, the French Revolution of 1789 was characterized by rationalism, by the rejection of any form of outside control as exercised by the Church up to the 18th century, and by the substitution of the secular state for the divine order. In the minds of the French revolutionaries, instruction was the first responsibility of the nation state, since it is at the source of human freedom and is the best assurance for forming free and emancipated citizens. Human freedom is primarily achieved through instruction, i.e., the acquisition of knowledge developed by the academic disciplines and supported by reason. Why is this the case in the Francophone tradition? To answer this question, we must come back to the French Republican conception (not to be confused with the American republican conception) that was developed during the French Revolution at the end of the 18th century. Historically, the best illustration of the Republican position can undoubtedly be found in the speeches that Condorcet (1989*a*, 1989*b*, 1994) delivered to the French National Assembly in 1791 and 1792. Indeed, Sachot (2004) notes that

To understand the distinction made in the French language between instruction and education—a distinction that sometimes goes so far as complete opposition—one must look back at the educational projects developed during the French Revolution, and more specifically the spring 1793 debate at the National Assembly following the Condorcet Report of December 1792. In 1791, Condorcet (1989*a*) had written that it was the duty of the Republic to provide public education, which “should be limited to instruction” (p. 56),

hence making a major distinction between education and instruction, as Lelièvre (1994) and Nique and Lelièvre (1993) have noted. In December 1792, in a famous speech on education made at the National Assembly, Condorcet (1989*b*) declared that

We must first educate students to reason, we must instruct students to listen only to reason, we must renounce the enthusiasm that might cloud or mislead reason, and we must accept wherever reason might lead; such is the approach required in the interest of humanity, and the principle upon which public instruction must be developed. It is, surely, necessary to speak to children’s imagination . . . but it would be wrong to want to seize their imagination, even in favour of what we fundamentally believe to be the truth. (p. 185)

In short, the function of education would be to transmit disciplinary knowledge, because, in the Francophone logic, this is the knowledge that paves the way to human liberty. But instruction could not, in Condorcet’s thinking, be boiled down to the mere transmission of knowledge. Instruction is liberating insofar as it is based on reason, on a rational process.

According to this logic, knowledge as “scientificity” is seen as the fundamental cognitive mediation in the process of objectivizing and apprehending the world. The individual’s relationship to the world demands a relationship to knowledge. Human emancipation therefore requires recourse to academic knowledge and to its underlying rationality,

since French Republican thinking, according to the position advocated by Condorcet, rejects all forms of inculcation. The surest way to protect oneself from the dangers of ideological influences (royalist, religious, etc.) is knowledge. As Sachot (2000) has pointed out, the French Revolution produced a major break with the previous education system that had been in place. The relationship to knowledge and to scientific disciplines proved fundamental, as it became the guarantor of cultural tradition. It thus became important to problematize knowledge, to question its meaning before taking action, and to debate the cognitive contents to be learned by future adult citizens. As a result, as Sachot underscores, the relationship to knowledge took on a primary role. It became important to question its attributes, its scientific nature (in the French sense of the scientific disciplines) and its contributions, and to make sure that the knowledge that is selected is both free of ideological bias and accessible to students. The epistemological and didactic perspectives precisely assume these functions. In short, the search for meaning and the defining of educational objects are essential.

The idea of emancipation is foundational to the establishment of modern education systems in Europe. As Green (1997) recalls, the foremost purpose of all education systems in Europe, during the reconceptualization of education systems in the 19th century in the context of democratic nation states, was to educate emancipated human beings, i.e., equal, free and autonomous individuals. The specificity of this purpose was to incorporate “populations into a community of citizens” (Schnapper, 1994, p. 28) and to guarantee that they could exercise democratic practices. Hence the need to establish a “Democratic school [that] must give to each the intellectual abilities required to genuinely participate in public life” (p. 95). This first aim of social emancipation linked with the establishment of democratic processes was closely tied to a second social aim: the need for all nation-states to develop national belonging, in other words to provide civic education or civic socialization that would guarantee the integration of identity into the social whole of the nation state.

Although the educational logics on both sides of the Atlantic are based on a radical reform of education systems that is consistent with the same fundamental aim of human emancipation, they have been opposed in terms of their means. The French-speaking European focus on the function of instruction as the transmission of knowledge safeguarded by the disciplines and by the cultural heritage has led to promoting the epistemological question of meaning, and thereby knowledge (the “object pole”<sup>27</sup>) and disciplinary

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<sup>27</sup> The term “pole” is not a geographical reference but is used by disciplinary



didactics. Moreover, socialization<sup>28</sup> is embedded within the universalist Republican framework. Civic education is therefore differently oriented in the French conception than in the American one. In the French Republican conception, citizenship is conceived as an indivisible whole in which all individuals are merged together. Each citizen is then considered to be detached from any belonging to specific characteristics: gender, social class, religion, age, etc. Citizens must also submit to a common law and recognize their duty to the community. Republican citizenship suggests the existence of a collective interest with which all citizens identify on the basis of a few principles that are presented as universal: liberty, equality, fraternity, and secularity. This conception, which sees citizens as indeterminate members of a collective, puts special emphasis on the duty of solidarity. Citizenship is also a state of mind that is expressed through adherence to a public culture. This culture transmits to the citizen the sense of a common past and a cultural heritage that reconciles the nation with the universal. Over the course of the Third French Republic (1870-1940), the more specific idea emerged that citizenship is acquired through culture. The Republican school then became the place for transmitting this culture that, once imparted to all pupils of the nation regardless of class, language or ethnicity, merges them together in order to serve the Republic, in accordance with each individual's talents. The most important characteristic of culture is knowledge inherited from the past. Out of respect for Republican principles, including that of equality, didacticians to describe each of the three main components of the earlier described "didactic system."

<sup>28</sup> From the Francophone perspective, the concept of socialization encompasses several meanings that we have explained in depth in Lenoir and Tupin (2012): 1) Socialization is seen as the process whereby a human being is integrated into society. We noted earlier that this conception of primary socialization is more strongly associated with the family in French Republican thought. 2) Academically speaking, the concept of socialization also refers to pupils' acquisition of the "ground rules" related to their schedule, discipline and tasks, which Perrenoud (1984b) and Sirota (1993) call the *métier d'élève* [the ability to play the part required at school] in order to characterize the tasks and constraints assigned to students in their duty as learners. 3) The concept of socialization is also understood as the development of what we call "facilitators," i.e., pedagogical methods intended to facilitate learning processes (Lenoir, 2014). 4) Socialization is also conceptualized as civic education, in close connection with a fifth conception. 5) Indeed, socialization can refer to the acquisition of cultural contents contained in the school disciplines (Mollo Bouvier, 1986; Dubar, 2006). As we have shown, this last conception of socialization, which is realized through disciplinary knowledge, is dominant in the Republican conception.

the *concours* or competitive examination therefore became the generalized system (unique to France) both within the school system (at all levels of instruction) and out, in order for one to hold a position of any kind.

Contrastingly, the American liberal conception postulates the pre-eminence of individual liberties and, by extension, the liberty of the private individual. Moreover, in this conception, the general interest is seen as the sum of specific interests. Americans, who are less inclined to the state governance of schools, recognize society itself—encompassing a mix of hopes and ambitions of citizens who are protective of their freedoms—as the crucible of citizenship, the famous “melting pot” or “salad bowl” of individuals of all origins who form a new people.

In the United States, the focus on the functionality of learning can be traced back to the pragmatism established at the end of the 19th century. This pragmatism should be associated with the preoccupation, dating to the same period, with placing the individual student at the heart of learning (the “subject pole”). Indeed, the need to socially integrate masses of immigrants necessitated a focus on pedagogical practices (to facilitate learning processes) and socialization processes (to foster civic skills). These two fundamental traits of the North American curricular conception have underpinned the professionalizing orientation of its education system. In the United States, the priority appears to be the adherence to the “virtues” and values of American society (personal skills) as well as know-how geared toward problem solving. In this sense, although both education systems have addressed personal skills and socialization (in France, with minister Jules Ferry, in particular, in the 1870s), these are not at all founded on the same principles. As we have noted, the conception of socialization is not built on the same model of citizenship; integrative and universalist republicanism stands in contrast to individualistic and utilitarian liberal thinking.

### 3. Interdisciplinarity in education, between didactics and curriculum

Although the concept of interdisciplinarity is used on both sides of the Atlantic, the brief socio-historical analysis we have sketched shows two distinct views in the United States and in French-speaking Europe.

The notion of interdisciplinarity first developed, in the United States, in response to social demands and pressure from a functional perspective. Klein (1990) observes that “instrumental interdisciplinarity is associated most often with the need to solve ‘practical’ problems” (p. 41). The same

author mentions the existence of another, philosophically rooted current:

The escalation of instrumental interdisciplinarity since mid-century has created an inevitable tension in the discourse between those who define interdisciplinarity as a philosophically conceived synopsis and those who believe interdisciplinarity is not a theoretical concept but a practical one that arises from the unsolved problems of society rather than from science itself. (p. 42)

As Klein (2005) notes in a different book, “Not all interdisciplinarity are the same [...]. Disagreements about definition reflect differing views of the purpose of research and education, the role of disciplines, and the role of critique” (p. 55). Without going into detail on the sociohistorical evolution of interdisciplinarity in education, Klein (2002) recalls that the 1980s “[were] a time of renewed interest in interdisciplinarity and curriculum integration.” She identifies “four major reasons for the resurgence of interest . . . : knowledge change, educational reform, problem solving and critique” (p. 3). Interdisciplinarity subsequently blossomed in the 1990s.

Whether one refers to Beane (1997), Jacobs (1989), Clarke and Agne (1997) or Klein (2002), all of these authors consider that what characterizes interdisciplinarity in education today “is process, not a fixed body of content” (Klein, 2002, p. 9). Today, above and beyond the justification of interdisciplinarity by “the ‘real-world’ argument [. . . that] problem-focus has attained center stage across the curriculum” (p. 7). Along similar lines, Boix Mansilla, Miller, and Gardner (2000) state that “interdisciplinary understanding is more than recalling information or reasoning in uninformed intuitive ways. Students demonstrate interdisciplinary understanding when they are able to use what they have learned to solve problems, create productions, or explain phenomena” (p. 26). Because, in interdisciplinary education, there is a focus on integration processes, the question of pedagogy is inescapable. Most of the books on interdisciplinarity in education underscore links with pedagogy, as teachers should not only transmit knowledge, but should also put in place all the conditions they judge to be appropriate to stimulate, guide, support and assess their students’ learning process. However, there are “differences in purpose and process” among teachers, in the words of Clarke and Agne (1997, p. xvi); the means they use show that “there is no unique interdisciplinary pedagogy” (Klein, 2002, p. 14).

In French-speaking Europe, it was primarily within academic debates, in an effort to structure the academic disciplines and put them into a hierarchy (Delattre, 1984; Kockelmans, 1979), that interdisciplinarity was initially discussed. However, the dizzying diversification of knowledge,<sup>29</sup> mainly after the Second World War and in conjunction with economic, political and social factors, expanded the debate beyond the confines of the university. The new debate took shape around three key areas:

- First, scientific development and the questioning of previously admitted certainties led to epistemological questions and a re-exploration of boundaries and fringes between academic disciplines in an effort to organize and avoid the fragmentation of scientific knowledge (Apostel, Berger, Briggs & Michaud, 1972; Kockelmans, 1979; Ansart, 1990).
- Second, there arose a societal questioning that went beyond the structure of studies and addressed the very meaning of the presence of human beings in the world, in addition to an attempt to integrate disciplinary knowledge and leverage it in the process of grasping a changing reality and of solving modern problems characterized by extreme complexity. Socio-political demands, such as concerns for peace, the environment, social justice and democracy, grew thanks to social movements and possibilities for expressing public opinion (Morin & Piattelli Palmarini, 1974; Babossov, 1978; Moroni, 1978; Sinacœur, 1983). This was eminently expressed by the ferment of the 1960s. In exercising critical thinking, these forces could hardly do without the light shed by the use of interdisciplinarity.

In the field of education, interdisciplinarity was initially called for by societal demands largely external to the education system itself, as illustrated by the student movements of the 1960s. Ansart (1990) has mentioned that “the terms of the debate have profoundly changed today, as have the interlocutors. Today it is professors, researchers and program directors who are raising questions, no longer under the pressure of student demands but because of the difficulty of putting together coherent programs that foster learning” (p. 26). This is attested by the multitude of studies in the United States pertaining to the development of interdisciplinary and integrative curricula (Klein, 1998; Pinar, Reynolds, Slattery & Taubman,

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<sup>29</sup> Berger (1972) speaks of its explosion, Stengers (1997), its obsessive differentiation, and Ansart (1990), its shattering.

1995). The preoccupations of researchers and academics confronted with the crises that have shaken the Western world have led them to reflect on the orientation and relevance of their actions. Over and beyond the many socio-political, economic and administrative motives cited to promote the use of interdisciplinarity, it would thus appear that the major argument lies today, first, in the links needed between the disciplines and, second, in students' ability to integrate, transfer and mobilize knowledge. This is the key educational issue, since knowledge integration is the essential dimension in the act of learning. Integration attests to successful learning. The concept of integration is therefore an indissociable companion to the concept of interdisciplinarity. In this context, the question that arises is how interdisciplinarity can foster integrative approaches that are able to produce and support integrating processes and integrated knowledge.

- The third key area is directly related to the tremendous increase in everyday professional activity and the needs of industrial societies. Sinacœur (1983) suggests that interdisciplinarity is not a category of knowledge, but rather a category of action, and it seems to be an instrument of choice for power: “[I]nterdisciplinarity betrays a feature of our times, namely the social integration of knowledge as a component of power; and power is essentially interested in applicable knowledge, the only kind that is able to guide it in developing the programs that structure its use” (p. 28). In this quote, Sinacœur could be said, in a sense, to have foretold the generalized establishment of utilitarian professionalizing perspectives in all education, from primary school through university. Even if the concept of competencies had not yet entered the vocabulary of the times, it is clear that he foreshadowed the competency-based approach. He also clearly perceived that the establishment of such orientations would profoundly change the previous Francophone conception of education and research, which would henceforth serve political and environmental forces.

Hence, in Francophone Europe, aside from epistemological motivations, in which “the scientific logic . . . gives rise to new objects and new complex problems by exceeding existing boundaries” (Callon, 1990, p. 76), interdisciplinarity was also sought by forces that were not directly academic, but rather related to socio-political issues, as well as by forces related to the growing complexity of social realities and to everyday technical and social requirements.

On one hand, outside (but closely linked to) the university institution

there developed a social, political and economic need for interdisciplinary activities. On the other hand, universities themselves experienced enthusiasm for interdisciplinarity, along with concern about the fragmentation of academic knowledge and the sense of a loss of internal organization. Setting aside for now the hegemonic development of vocational training programs, which we will address further on, at least two conceptions of knowledge grew opposed—two rival paradigms according to Kuhn (1972) and Stengers (1993), both of which called for interdisciplinarity. Based on the traditional assertion of the independence if not the neutrality of science, one conception considers that the boundaries erected by the academic disciplines, as well as the boxed-in state in which they confront one another (Morin, 1990b), constitute obstacles to the search for new knowledge. These barriers are thought to be incompatible with the unceasing processes of dynamic interrelation that were originally behind the constitution of the system of the sciences. As Stichweh (1991) notes when addressing the emergence of the *disciplines scientifiques*,<sup>30</sup>

the disciplines . . . are . . . historically variable units that become associated with other disciplines, within a system that subsumes them all, precisely through processes of dynamic interrelation. . . . science increasingly exhibits a closed-off self-referential system . . . that can no longer be organized by external interventions—even philosophical. The differentiation of the disciplines does not appear as the beginning of fragmentation and a loss of organization. Instead, it seems to be a mechanism of system self-organization that replaces external organizing interventions. (pp. 20, 21)

This explains the demand in Francophone Europe to come back to

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<sup>30</sup> As a reminder, in French, the term “*disciplines scientifiques*” is used to qualify the natural sciences as well as the humanities and social sciences, in research, practice and teaching. However, a distinction is made in French between *savoirs*, knowledge originating from research, and *connaissances*, knowledge originating from experience. In the case here discussed, Stichweh (1991) analyzes the shift, at the turn of the 19<sup>th</sup> century, from control of knowledge production by religious authorities and by philosophy (heteronomous control) to internal control by the scientific community. More specifically, he shows how the first scientific disciplines (chemistry and physics) were produced and academically established in Germany.



interdisciplinarity as an inherent dimension of all the academic disciplines forged in the 19th and 20th centuries that was left in the shadows following their institutionalization<sup>31</sup> as disciplines (Palmade, 1977; Stichweh, 1991).<sup>32</sup> A second conception, for its part, promotes the idea that scientific activity (in the Francophone sense of “scientific”), even if it has its own specificity, “calls into question all separation between the sciences and society” (Stengers, 1993, p. 11). One might go so far as to say that science is then approached as “a social enterprise like any other, neither more detached from worldly concerns, nor more universal or rational than any other” (p. 11). It only seeks to respond to contexts, expectations and social constraints. The scientific disciplines are then grasped as arbitrary constructions that are historically situated and marked by the social preoccupations of the times. This second conception also emphasizes the complexity that characterizes the real and the need to take into account its component interactions. From this postmodern perspective, the use of interdisciplinarity becomes necessary as a result of the need for another method by which to analyze our world, but also as a result of social aims, since no single scientific discipline can adequately address highly complex problems.

Klein (1985) and Lynton (1985) have likewise shown that interdisciplinarity adopts two major and distinct orientations: the search for a conceptual synthesis, i.e., a unification of the academic disciplines and perhaps even the quest for the unity of knowledge; and an instrumental approach. In the first case, which could be described as academic interdisciplinarity, the idea, out of a wish to unify the sciences, would be to identify a coherent and hierarchically well connected structure among the various disciplines

<sup>31</sup> Palmade (1977) and Stichweh (1991) show that the scientific disciplines were produced in an interdisciplinary manner, by drawing from current practices, by forging concepts of various origins, etc. Their institutionalization led to obscuring this interdisciplinary and even transdisciplinary origin.

<sup>32</sup> It is important as the following paragraph points out, not to forget the earlier demand for scientific unification along the lines that the Vienna Circle articulated. It is also important to bear in mind the demand for interdisciplinarity on the heels of World War II as the result of the failed empiricist and positivist program of the *Einheitswissenschaften* (unified sciences) and their logical analysis, partly announced by Gödel’s proof of incompleteness. A very simple example that serves as a rudimentary illustration of Gödel’s theorem is the following well known paradox: A Cretan says, “All Cretans are liars.” Is this Cretan telling the truth when pronouncing this sentence? According to Gödel, this is an “undecidable” statement, because it cannot be demonstrated, hence its incompleteness. See the lithograph “Print Gallery” as a graphic illustration of Gödel’s incompleteness theorem by M.C. Escher (Hofstadter, 1985).

that make up science. This was in fact the explicit project of positivism and Auguste Comte and the Vienna Circle in particular, along with Carnap (1938) or Neurath (1938), for example. The idea would be to identify a super-science (metatheory or metadiscipline) or at least a unified language. However, some academics, including Caillé (1997), are opposed to the temptation of a positivist discourse that would promote a super-science or metadisciplinarity (via transdisciplinary discourse and the merging of different disciplines) to achieve greater efficiency and objectivity, if not universality. The concept of interdisciplinarity has to do with relationships within the system of the sciences. This is the way Francophone Europe has mainly understood the concept, that is, by associating the issue of interdisciplinarity with the structural and hierarchical relationships among disciplines. As a result, Francophone Europe considers the use of interdisciplinarity in education from an epistemological standpoint; the question of the relationship to knowledge is at the heart of the debates among disciplinary didacticians.

The instrumental approach, on the other hand, is more specific to the American conception. It is geared toward external interactions, according to Klein (1990). It promotes the use of knowledge that is directly functional and usable for addressing contemporary societal problems, questions and expectations, for example in terms of vocational training. For Klein and Newell (1996) and Newell (2001) the nature of interdisciplinarity is not primarily theoretical, but pragmatic or organizational. Interdisciplinarity, especially in education, is instrumental, operational and procedural in nature. More broadly speaking, it is an indication of an orientation of our Western societies, more than the emergence of this orientation:

[I]t is not the emergence of a way to address increasingly separated knowledge, but rather the sign of a preference for informed decision making, based on technically founded views, and on the desire to make decisions on the basis of scenarios underpinned by specific knowledge. This is why interdisciplinarity finds anchoring points in all the applied sciences, social or other. (Sinacœur, 1983, pp. 25-26)

Fourez (1992) suggests that interdisciplinarity be considered as a particular practice “aimed at approaching the problems of everyday existence [the goal of which is not] to create a new scientific discipline or a universal discourse, but to solve a concrete problem” (p. 110). In this context, still according to

Fourez, “interdisciplinarity is perceived as an essentially ‘political’ practice, i.e., as a negotiation between different standpoints with a view to deciding on a representation deemed relevant to performing an action” (pp. 110-111). Hamel (1995) likewise notes that “interdisciplinarity perhaps finds its form and relevance less in developing the knowledge and explanations to which each discipline aspires, than in terms of practical or political action” (p. 17).<sup>33</sup>

#### 4. Evolving conceptions

Apostel and Vanlandschoot (1994), in the context of research on interdisciplinarity performed by the Organisation for Economic Co-operation and Development (OECD), discuss the debates on this subject in the early 1970s. They astutely point out that these two visions, at least in their origins, are continental—the first, European, being strongly marked from a social, epistemological and ideological standpoint, and the second, Anglo-Saxon, being more pragmatic and operational in nature.

In the French perspective, interdisciplinarity was, until very recently, mainly approached from a traditional standpoint, fully consistent with the prevailing logic of meaning (of the disciplines and their interrelations) and the related epistemological perspective of the system of the disciplines. This conception is still very much alive today. Seeking a conceptual synthesis (that of an academic interdisciplinarity), this form of interdisciplinarity is intended to be reflexive and critical, geared toward either the positivist effort of unifying academic knowledge or the effort of epistemologically reflecting on disciplinary knowledge in its interactions. The debate, in the education system, then primarily deals with the search for epistemological meaning and the relevance of links between the disciplinary knowledge to be taught. The very few empirical studies carried out in France favor, among other things, the notions of versatility (*polyvalence* in French) and codisciplinarity, if not pluridisciplinarity and multidisciplinarity (Baillat, 2001). In education today,

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<sup>33</sup> A substantial proportion of Francophone European researchers who are studying interdisciplinarity today, whether in the context of research or teaching, consider that interdisciplinarity is a political issue used by governments to influence the directions of research and education. They therefore also associate interdisciplinarity with practical and operational stakes that result from political issues. In these researchers’ view, governments impose ways of conducting research or teaching that are incompatible with their conceptions, which are characterized by Republicanism and freedom of action.

the interdisciplinary approach, at least in the French-speaking world, is mainly understood in the sense suggested by Huber (1992): “[I]nterdisciplinary studies must have their place as a supplement, even a corrective measure for education and training based on the disciplines” (p. 194). Interdisciplinarity offsets the weakness of disciplinary education, in terms of the construction of social and biophysical reality as well as the construction of the meaning students seek in their learning and their intellectual, motor and affective engagement in this learning. In parallel with this epistemological conception, since the 1990s, a practical interdisciplinarity has developed under the influence of the transformations that have occurred in Francophone European societies. However, it remains weak and tentative in the field of education, because it is judged to be at odds with the disciplinary structure defended by disciplinary didactics. In Francophone societies, the introduction of the competency-based approach, in education and in teacher education, requires a rearrangement of the relationships between the disciplines. This rearrangement has been very extensive in Quebec and French-speaking Switzerland. However, the latter is reversing course. In French-speaking Belgium and especially in France, this rearrangement is largely mitigated by a recognition of the key importance of school disciplines as separate disciplines.

In the United States, interdisciplinarity is primarily implemented from a functional and instrumental perspective, in a search for operational answers to questions that arise within society. This focus on solving societal problems can be characterized as a “project” interdisciplinarity in which the knowledge that is used is immediately useful and operational. In primary and secondary school, this mainly means ways of arranging learning situations based on a variety of organizational models in order to help achieve the aims of social integration and of instrumentally apprehending reality.<sup>34</sup> This does not, however, mean that the disciplinary preoccupation has disappeared. Newell (1998) stresses “the value of the disciplines” (p. 54). Elsewhere, he mentions that

It is important for interdisciplinarians to keep in mind

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<sup>34</sup> Only extremely rarely do French-language publications present interdisciplinary design models in education and/or suggest interdisciplinary educational methods. These publications primarily discuss the relationships between the disciplines. The English literature, in contrast, counts many publications that present interdisciplinary design models and deal with ways to provide interdisciplinary instruction. See for instance Jacobs (1989), Fogarty (1991), Vars (1993), Frazee and Rudnitski (1995), and Clarke and Agne (1997)

the value of the disciplines. It is easy to dismiss them as arbitrary or artificial ways of dividing up reality, ignoring the extent to which they offer alternative ways of viewing reality, each grounded in a worldview that has demonstrated its fruitfulness over time or a range of topics studied by an on-going group of scholars. The disciplines can provide valuable insight into the complexity of an issue as a whole, not just into different pieces of that whole. (Newell, 1990, p. 73)

Recent publications, for example Repko (2012), Stone (2014) and Wineburg and Grossman (2000), show a strong concern for the disciplines, a concern that appears to us greater than in the past and that has the advantage of offering a critical viewpoint. Klein (2005, 2010) mentions that the current professionalizing orientation calls for critical thinking. Furthermore, Klein (2005) observes the existence “of a form of ‘critical interdisciplinarity’ that aims to transform existing structures of knowledge and education” (p. 56). On this subject, she notes that “humanities disciplines are being rejustified in epistemological and civic terms” (p. 215). As Stone (2014), for example, has shown, critical questioning seeks to use transdisciplinary reflection to move beyond the limits established between the disciplines and interdisciplinarity. In 1995, Squire pointed out that “it is evident that disciplinary and interdisciplinary understandings are fundamentally interconnected” (p. 83). At the same time, it is worth mentioning that this perspective is not universally shared, as a book by Moran (2010) attests. In the American school system, it would appear that observations made in the past are still valid today. Two recent studies, one by Niess and Gillow Wiles (2013), the other by Araujo, Jacobson, Singletary, Wilson, Lowe, and Marshall (2013), show that primary and secondary teachers understand the notion of integration and interdisciplinarity in different ways. Teachers are filled with good will and good intentions, but the way they use these

concepts in their teaching remains intuitive, incoherent or even superficial.<sup>35</sup> The observations made, for example, by Jacobs in 1989 are the same observations we have systematically made since 1980 in regard to Quebec primary teachers (Lenoir & Hasni, 2010). In teacher-student relationships pertaining to the content that is taught, the place given to critical thinking is also very limited.

## Conclusion

We have just presented two different logics, one organized around knowledge objects that above all questions their meaning on an epistemological level (the “why” and the “what”), hence the importance of disciplinary didactics, and the other organized around the subject that focuses on the means by which knowledge is attained (the “how”), hence the importance assigned to pedagogical and organizational aspects from a curricular perspective. The use of two distinct notions, didactics and curriculum, clearly marks two different ways to actualize distinct socio-educational aims, in close connection with their respective cultural and educational logics. A comparative look at these two logics reveals characteristic features that are clearly opposed when considered in terms of socio-historical traditions. In French-speaking Europe, didactics promotes the relation to knowledge, primarily for the teacher, and is above all concerned with the discipline and its component knowledge. By contrast, in the United States, the curricular approach puts greater focus on the institutional organization of knowledge and on its operationalization in life, rather than on the epistemological question, and is geared toward the subject and pedagogical perspectives. The systemic and functional dimensions in this last case prevail over the epistemological perspective on knowledge. Indeed, the very status of knowledge and its relationship to the sciences are different in the two cultures, as evidenced by the use of the term “school subjects” in the Anglo-Saxon tradition as opposed to “*disciplines scolaires*” (in relation to the *disciplines scientifiques*) in the Francophone tradition. The systemic and functional dimensions in the United States also prevail over

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<sup>35</sup> The intent here is not to be critical of teachers’ work. These teachers often work under pressure and in hurried conditions, and they are frequently confronted with classroom situations that are multidimensional and need to be resolved quickly. They conduct themselves by a different logic than researchers, namely what Bourdieu (1980) calls a *pratique pratique* or practical practice. Their practice is practical insofar as it is judged to be both effective and energy-efficient.



questions related to epistemological (and other, particularly political) issues in connection with this knowledge and the meaning that learning subjects might assign to it. This does not point to the absence of an epistemological debate in the Anglophone field of education. However, the debate is primarily located upstream of implementation in the school system, given the central place of pedagogical issues associated with operational methods and the transmission of learning contents. In France, the debate unfolds directly in the educational institution itself, with the epistemological question being at the heart of educational processes.

As we have noted, Klein (1990) has pointed out the tension that exists between two conceptions of interdisciplinarity: the conception of a philosophical synopsis (theoretical perspective), and the conception of a practical approach. Palmade (1977) has also mentioned the existence of a possible conceptual contradiction by distinguishing between an interdisciplinarity that sets out relationships between academic disciplines and a “project” interdisciplinarity centered on practice and implemented “in the field.” However, we agree with Klein (1985) and Lynton (1985) that these two visions, which might at first glance appear to be antithetical, must both be preserved and maintained. Above all, it is important to use them complementarily, since they “are not mutually exclusive” (Lynton, 1985, p. 141), and thereby to avoid the danger of idealistic or techno-instrumental excesses. If the instrumental approach, taken in isolation, can be a powerful supplement or “additive” for solving various kinds of societal problems, it can also circumscribe intellectual activity to concerns exclusively focused on commercial viability, or subject university education—both teaching and research—to political or economic requirements. The epistemological approach for its part can shed light on the complexity, foundations and issues inherent to disciplinary relationships. However, it can also increase disciplinary fragmentation or produce isolation from a real-world perspective (in the sense that the Francophone conception might attach little importance to current societal questions). Hermerén (1985) further notes the complementarity that is needed, from a knowledge integration perspective, between knowing “that,” associated with academic interdisciplinarity, and knowing “how,” associated with instrumental interdisciplinarity, i.e. between the knowledge he describes as propositional (declarative knowledge) and operational (procedural knowledge). Palmade (1977) similarly notes the need for this dialectical complementarity between two visions of interdisciplinarity in order to avoid the danger of falling into a purely mechanical instrumentalization: “The interdisciplinarity that can be

established between academic disciplines must serve as a foundation for project interdisciplinarity, which in turn can help provoke and foster a search for links between disciplines” (p. 287).

Currently, in our view, one can only rejoice at the promise of the reconciliation of these two logics that have developed. They both have their riches and their limitations. This reconciliation can only be beneficial for the implementation of interdisciplinary approaches in education.

It is our belief that Klein (1996) offers a first very interesting avenue for reflection. Inspired by the “depth-breadth” metaphor generally associated with academic activity, and in line with the works of Bernstein (1971, 1975), Klein (1996) applies this metaphor to interdisciplinary work. She connects the idea of breadth with “a comprehensive approach based in multiple variables and perspectives” (p. 212) and that of depth with the development of competencies at the disciplinary, interdisciplinary and vocational levels. She complements both dimensions with the idea of synthesis, which “connotes creation of an interdisciplinary outcome through a series of integrative actions” (p. 212). This “depth-breadth-synthesis” interaction is indispensable in education in order to move beyond the strictly disciplinary logic based on mastery (depth, specialization) of a discipline in order to characterize (describe, explain) a segment of reality (its “adequacy”). Depth involves the development of relevant competencies on a cognitive level, the mastery of required knowledge of various types—and not only disciplinary knowledge—in order to carry out learning processes. As Klein notes,

There is a crucial difference between the metaphors of mastery and of adequacy. The metaphor of mastery implies complete knowledge of a discipline. Adequacy shifts the role of a discipline to another ground, the interdisciplinary task at hand. The difference between mastery and adequacy lies in the difference between learning a discipline in order to practice it and comprehending how that discipline characteristically looks at the world—its observational categories, key terms, and relevant methods and approaches. (p. 212)

Klein further clarifies that

the discussion is incomplete if adequacy of disciplinary knowledge remains the primary focus, The notions of “depth” and “rigor” are usually equated with disciplinarity. In interdisciplinary activity, they are redefined. Depth

in interdisciplinary work derives from competence in pertinent knowledges and approaches. Rigor derives from attention to integrative process. (p. 212)

From this perspective, education is not defined as the learning of disciplines with a view to practicing them or teaching them in isolation (mastery). Instead, the disciplines fall under an “oriented” approach; that is, the goal of education, from a disciplinary standpoint, becomes to understand the specific ways that disciplines apprehend reality and to identify their respective functions and uses, which Klein refers to as adequacy. Synthesis means taking into account the diverse dimensions that compose the teaching act, in order to promote a perspective that goes beyond mere curricular/disciplinary/didactic arrangements, and to anchor the acquired knowledge and developed competencies in reality and make them meaningful.

A second avenue would be to ensure that the two logics we have presented coexist in an “open relationship,” while recognizing the conceptually simplistic nature of this statement in the context of this article and its space limitations. In the field of education, we believe that they should not be separated. The desirability of this inseparable relationship is based on the idea that interdisciplinarity requires a “beneficial” tension with respect to its aims, a complementary relation between the epistemological and instrumental perspectives (see Table 1).

**Table 1**  
**Tension between the epistemological and functional perspectives**

Epistemological perspective	Functional perspective
<p>A perspective seeking conceptual (academic) synthesis</p> <ul style="list-style-type: none"> <li>- Quest for the unity of knowledge</li> <li>- Search for a super-science</li> <li>- Fundamentally philosophical and epistemological focus (meaning)</li> <li>- Goal: creation of a global conceptual framework that could unify all scientific knowledge, with a view to integration</li> </ul>	<p>A pragmatic, instrumental perspective</p> <ul style="list-style-type: none"> <li>- Utilization of directly functional and usable knowledge to answer questions and address contemporary societal problems and societal expectations</li> <li>- A specific practice used to solve problems by drawing on different types of competencies</li> </ul>

This tension especially reveals the need to pose and construct a problem (cognitive perspective, search for meaning) before looking to solve it (pragmatic perspective, search for functionality). Conceptualization comes before problem solving. In other words, it is important to know in order to be able to act consciously and rationally. These two phases constitute an indissociable link between conceptualization and real life, in that they put the human being at the heart of this relationship. To put it otherwise, interdisciplinarity is linked to the mind (search for meaning, knowledge and the epistemological dimension), the hand (search for functionality, know-how and practice) and the heart (search for humanity in human beings, know-how, affectivity). We have not addressed this last component, which should be closely associated with the two others. Here we can merely refer the reader to the *conatus* of Spinoza (1990/1677). The *conatus*, the effort by which “each thing, insofar as in it lies, always perseveres in the same state, and when once moved, always continues to move” (part III, proposition 6), characterizes the energy of desire. This is the impulse that prompts the change from rest to movement, to the desire to engage. What is behind the *conatus* is the affect (feelings, emotions, etc.) that result from a human being’s interpretation of a situation. In our view, positive affects are necessary in education in order to engage the mind and the hand. In this dialectical relationship, reason, as we have described it, plays a role of mediation between the hand and the heart.

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## References

- Alberty, E. J. & May, W. T. (1987). Curriculum: Then and now [Special issue]. *Theory into Practice*, 2, 319-323.
- Anderson, P. (1996). Histoire et leçon du néolibéralisme. La construction d'une voie unique. *Page deux, Octobre* Retrieved from [http://www.fastnet.ch/Page2/p2\\_neolib\\_anderson.html](http://www.fastnet.ch/Page2/p2_neolib_anderson.html)
- Ansart, P. (1990). Pluralisation des savoirs et formation scientifique. In G. Racette & L. Forest (Eds.), *Pluralité des enseignements en sciences humaines à l'université* (pp. 21-29). Montreal, PQ, Canada: Éditions Noir sur blanc.
- Apostel, L., Berger, G., Briggs, A. & Michaud, G. (Eds.). (1972). *L'interdisciplinarité. Problèmes d'enseignement et de recherche dans les universités*. Paris: OCDE/Centre pour la recherche et l'innovation dans l'enseignement.
- Apostel, L. & Vanlandschoot, J. (1994). Interdisciplinarity: The construction of worldviews and the dissemination of scientific results. *Issues in Integrative Studies*, 12, 9-22.
- Astolfi, J.-P. (1997). Du "tout" didactique au "plus" didactique. *Revue française de pédagogie*, 120, 67-73.
- Baillat, G. (2001). *Enquête sur la polyvalence des enseignants du premier degré. Rapport de recherche 1996-2000*. Reims, France: Institut universitaire de formation des maîtres (IUFM) de Reims.
- Babossov, E. M. (1978). L'homme, sujet d'études interdisciplinaires. *Diogène*, 104, 24-38.

- Beane, J.A. (1997). *Curriculum integration. Designing the core of democratic education*. New York, NY: Teachers College Press.
- Benvéniste, É. (1969). *Le vocabulaire des institutions indo-européennes* (2 t.). Paris, France: Éditions de Minuit.
- Berger, G. (1972). Opinions et réalités. In L. Apostel, G. Berger, A. Briggs & G. Michaud (Eds.), *L'interdisciplinarité. Problèmes d'enseignement et de recherche dans les universités* (pp. 21-69). Paris, France: Organisation de coopération et de développement économiques, Centre pour la recherche et l'innovation dans l'enseignement.
- Berger, P. & Luckmann, T. (1966). *The social construction of reality: A treatise in the sociology of knowledge*. Garden City, NY: Anchor Books.
- Berman, L. M. (1987). Perception, paradox, and passion: Curriculum for community. *Theory into Practice*, 26, 346-350.
- Bernstein, B. (1971). On the classification and framing of educational knowledge. In M. F. D. Young (Ed.), *Knowledge and control. New directions for the sociology of education* (pp. 47-69). London, UK: Collier-Macmillan.
- Bernstein, B. (1975). *Langage et classes sociales. Codes socio-linguistiques et contrôle social*. Paris, France: Minuit.
- Boix Mansilla, V. & Lenoir, Y. (2010). Interdisciplinarity in United States schools: Past, present, and future. *Issues in Integrative Studies*, 28, 1-28.
- Boix Mansilla, V., Miller, W. C. & Gardner, H. (2000). On disciplinary lenses and interdisciplinary work. In S. Wineburg & P. Grossman (Eds.), *Interdisciplinary curriculum: Challenges to implementation*. New York, NY: Teachers College Press.
- Bourdieu, P. (1980). *Le sens pratique*. Paris, France: Éditions de Minuit.
- Burbules, N. C. & Torres, C. A. (Eds.). (2000). *Globalization and education. Critical perspectives*. New York, NY: Routledge.
- Caillé, A. (1997). Présentation. *La revue du M.A.U.S.S. semestrielle*, 10, 5-20 (Special issue: "Guerre et paix entre les sciences. Disciplinarité, inter et transdisciplinarité").
- Caillé, A., Lazzeri, C. & Senellart, M. (Eds.). (2001). *Histoire raisonnée de la philosophie morale et politique. Le bonheur et l'utile*. Paris, France: La Découverte.
- Callon, M. (1990). L'évaluation interdisciplinaire et sa gestion. In Centre national de la recherche scientifique, *Actes du colloque "Carrefour des sciences". Session plénière du Comité national de la recherche scientifique: L'interdisciplinarité* (pp. 75-83). Paris, France: PAPCOM.
- Canavolas, J.A. & Bilbeau, G. (1996). *Jan Amos Comenius (1592-1670). Aspects culturels, philosophiques, pédagogiques et didactiques de son œuvre*. Montréal, PQ, Canada: Publications de Faculté des sciences de l'éducation, Université de Montréal.
- Capková, D. (1992). La conception de la "Cultura universalis" chez Comenius. In J.A. Caravolas & G. Bibeau (Eds.), *Jean Amos Comenius (1592-1670). Aspects culturels, philosophiques, pédagogiques et didactiques de son œuvre* (Actes du colloque international Comenius, pp. 19-39). Montréal, PQ, Canada: Université de Montréal, Faculté des sciences de l'éducation.



- Carnap, R. (1938). Logical foundations of the unity of science. In R. Bohr, R. Carnap, J. Dewey, C.W. Morris, O. Neurath & B. Russell, *International encyclopedia of unified science* (Vol. 1, pp. 42-62). Chicago, IL: The University of Chicago Press.
- Cauly, O. (1995). *Comenius*. Paris, France: Éditions du Félin.
- Charlot, B. (1987). *L'école en mutation*. Paris, France: Payot.
- Charlot, B. (Ed.). (1995). *Les sciences de l'éducation, un enjeu, un défi*. Paris, France: ESF.
- Clarke, J.H. & Agne, R.M. (1997). *Interdisciplinary high school teaching*. Boston, MA: Allyn & Bacon.
- Condorcet (M. J. A. Caritat, marquis de) (1989a). *Écrits sur l'instruction publique*. Vol. I: *Cinq mémoires sur l'instruction publique* (Text presented, annotated and commented on by Charles Coutel & Catherine Kintzler). Paris, France: Édilig (1<sup>st</sup> ed. 1791-1792).
- Condorcet (M. J. A. Caritat, marquis de) (1989b). *Écrits sur l'instruction publique*. Vol. II: *Rapport sur l'instruction* (Text presented, annotated and commented on by Charles Coutel & Catherine Kintzler). Paris, France: Édilig (1<sup>st</sup> ed. 1791-1792).
- Condorcet (M. J. A. Caritat, marquis de) (1994). Rapport et projet de décret sur l'organisation générale de l'instruction publique présentés à l'Assemblée nationale, au nom du Comité d'instruction publique les 20 et 21 avril 1792. In J. Dumazedier & É. Donfu, *La leçon de Condorcet. Une conception oubliée de l'instruction pour tous nécessaire à une république* (pp. 131-173). Paris, France: L'Harmattan.
- Connelly, F. M. & Clandinin, D. J. (1988). *Teachers as curriculum planners. Narratives of experiences*. New York, NY and Toronto, Canada: Teachers College, Columbia University & The Ontario Institute for Studies in Education, University of Toronto.
- Coulby, D. (2000). *Beyond the national curriculum. Curricular centralism and cultural diversity in Europe and the USA*. London, UK: Routledge.
- Cremin, L. (1955). The revolution in American secondary education, 1893-1918. *Teachers College Record*, 56, 295-308.
- Cremin, L. (1964). *The transformation of the school: Progressivism in American education, 1876-1957*. New York, NY: Vintage.
- Cremin, L. (1970). *American education: The colonial experience 1607-1786*. New York, NY: Harper & Row.
- Cremin, L. (1971). Curriculum-making in the United States. In W.F. Pinar (Ed.), *Curriculum theorizing: The reconceptualists* (pp. 19-35). Berkeley, CA: McCutchan.
- de Araujo, Z., Jacobson, E., Singletary, L., Wilson, P., Lowe, L. & Marshall, A. M. (2013). Teachers' conceptions of integrated mathematics curricula. *School Science and Mathematics*, 113(6), 285-296.
- Delattre, P. (1984). Interdisciplinaires/Recherches. In *Encyclopedia Universalis* (pp. 1261-1266). Paris, France: Encyclopedia Universalis.
- Delumeau, J. (1965). *Naissance et affirmation de la Réforme*. Paris, France: Presses universitaires de France.
- Denis, M. (1994). *Comenius. Une pédagogie à l'échelle de l'Europe*. Paris, France:

- Presses universitaires de France.
- Develay, M. (1997). Origines, malentendus et spécificités de la didactique. *Revue française de pédagogie*, 120, 59-66.
- Dewey, J. (1964). *Democracy and education. An introduction to the philosophy of education* (4<sup>th</sup> ed.). New York, NY: The Macmillan Company.
- D'Hainaut, L. (1979). Les lignes de force de l'élaboration d'un curriculum. In L. D'Hainaut (Ed.), *Programmes d'études et éducation permanente* (pp. 83-105). Paris, France: Unesco.
- Dorier, J.-C., Leutenegger, F. & Schneuwly, B. (2013). Introduction. Le didactique, les didactiques, la didactique. In J.-C. Dorier, F. Leutenegger & B. Schneuwly (Eds.), *Didactique en construction, construction des didactiques* (pp. 7-35). Bruxelles, Belgium: De Boeck.
- Doyle, W. (1992). Curriculum and pedagogy. In P.W. Jackson (Ed.), *Handbook of research on curriculum. A project of the American Educational Research Association* (pp. 486-516). New York, NY: Macmillan Publishing Company.
- Dreeben, R. (1976). The unwritten curriculum and its relation to values. *Journal of Curriculum Studies*, 8(2), 111-124.
- Dubar, C. (2006). *La socialisation. Construction des identités sociales et professionnelles*. Paris, France: Armand Colin.
- Durand, M.-J. (1994). *État de la question conduisant à la conception d'un réseau notionnel du domaine curriculaire*. Doctoral thesis, Faculté d'éducation, Université du Québec à Montréal, PQ, Canada.
- Duru-Bellat, M. & van Zanten, A. (1999). *Sociologie de l'école* (2<sup>nd</sup> ed.). Paris, France: Armand Colin.
- Eisner, E. W. (1985). *The educational imagination. On the design and evaluation of school programs* (2<sup>nd</sup> ed.). New York, NY & London: Macmillan & Collier Macmillan (1<sup>st</sup> ed. 1979).
- Éliard, M. (1994). Modernité de l'idéal démocratique et de la science morale et politique de Condorcet — Exposé. In J. Dumazedier & É. Donfu (Eds.), *La leçon de Condorcet. Une conception oubliée de l'instruction pour tous nécessaire à une république* (pp. 64-74). Paris, France: L'Harmattan.
- Engelsen, B.U. (1990). Didactics: Swedish and Norwegian understandings compared by a Norwegian. *Scandinavian Journal of Educational Research*, 34(4), 285-299.
- Englund, T. (2010). New trends in Swedish educational research. *Scandinavian Journal of Educational Research*, 50, 383-396.
- Favre, B. (1988). Les stratégies des maîtres face aux transformations du curriculum de français. In P. Perrenoud & C. Montandon (Eds.), *Qui maîtrise l'école? Politiques d'institutions et pratiques des acteurs* (pp. 157-174). Lausanne, Switzerland: Réalités sociales.
- Flexner, H. (1979). The curriculum, the disciplines, and interdisciplinarity in higher education: Historical perspective. In J. J. Kockelmans (Ed.), *Interdisciplinarity and higher education* (pp. 93-122). Pittsburg, PA: The Pennsylvania State University Press.
- Freitag, M. (2011). *L'abîme de la liberté. Critique du libéralisme*. Montréal, PQ, Canada: Liber.
- Flinders, D. J. & Thornton, S. J. (Eds.). (1997). *The curriculum studies reader*. New York, NY: Routledge.

- Fogarty, R. (1991). *How to integrate the curricula*. Palatine, IL: IRI/Skylight Publishing.
- Forquin, J.-C. (1984). La sociologie du curriculum en Grande-Bretagne: une nouvelle approche des enjeux sociaux de la scolarisation. *Revue française de sociologie*, *XXV*, 211-232.
- Forquin, J.-C. (1989). *École et culture. Le point de vue des sociologues britanniques*. Brussels, Belgium: Éditions universitaires/De Boeck.
- Forquin, J.-C. (1994). Curriculum. In P. Champy & C. Étévé (Eds.), *Dictionnaire encyclopédique de l'éducation et de la formation* (pp. 218-223). Paris, France: Nathan.
- Forquin, J.-C. (1997). *Les sociologues de l'éducation américains et britanniques. Présentation et choix de textes*. Bruxelles, Belgium-Paris, France: De Boeck Université & Institut national de recherche pédagogique.
- Forquin, J.-C. (2000). L'école et la question du multiculturalisme: approches françaises, américaines et britanniques. In A. van Zanten (Ed.), *L'école. L'état des savoirs* (pp. 151-160). Paris, France: La découverte.
- Fourez, G. (1992). *La construction des sciences. Les logiques des interventions scientifiques. Introduction à la philosophie et à l'éthique des sciences* (2<sup>nd</sup> ed.). Brussels, Belgium: De Boeck Université (1<sup>st</sup> ed. 1988).
- Franklin (1986). *Building the American community: The school curriculum and the search for control*. Philadelphia, PA: Falmer.
- Frazer, B. & Rudnitski, R. A. (1995). *Integrated teaching methods: Theory, classroom applications, field-based connections*. Albany, NY: Delmar.
- Garin, É. (1968). *L'éducation de l'homme moderne. La pédagogie de la Renaissance (1400-1600)*. Paris, France: Fayard.
- Geoffroy, Y. (2003). *Les représentations sociales des professeurs de sciences humaines de deux cégeps au regard de l'interdisciplinarité, de l'intégration et de l'identité professionnelle dans un contexte de réforme curriculaire de l'enseignement collégial*. Doctoral thesis in education, Faculté d'éducation, Université de Sherbrooke, Sherbrooke, PQ, Canada.
- Gersten, R., Baker, S., Pugach, M., Scanlon, D. & Chard, D. (2001). Contemporary research on special education teaching. In V. Richardson (Ed.), *Handbook of research on teaching* (pp. 695-722). Washington, DC: American Educational Research Association.
- Glanz, J. (1990). Beyond bureaucracy: Notes on the professionalization of public schools supervision in the early 20<sup>th</sup> century. *Journal of Curriculum and Supervision*, *5*(2), 150-170.
- Goelzer, H. (1928). *Dictionnaire Latin-Français*. Paris, France: Librairie Garnier Frères.
- Goodlad, J. (1979). *Curriculum inquiry: The study of curriculum practice*. New York, NY: McGraw-Hill.
- Green, A. (1997). *Education, globalization and the nation state*. Houndmills: Macmillan Press.
- Gundem, B.B. (1992). Notes on the development of Nordic didactics. *Journal of Curriculum Studies*, *24*(1), 61-70.
- Gundem, B.B. (1995). The role of didactics in curriculum in Scandinavia. *Journal of Curriculum and Supervision*, *10*(4), 302-316.

- Gundem, B. B. & Hopmann, S. (Eds.). (1998). *Didaktik and/or curriculum. An international dialogue*. New York, NY: Peter Lang.
- Habermas, J. (1973). *La technique et la science comme "idéologie"* (Trans. J.-R. Ladmiral). Paris, France: Gallimard (1<sup>st</sup> ed. 1968).
- Habermas, J. (1976). *Connaissance et intérêt* (Trans. G. Cléménçon). Paris, France: Gallimard (1<sup>st</sup> ed. 1968).
- Hamel, J. (1997). *Précis d'épistémologie de la sociologie*. Paris, France: L'Harmattan.
- Hameyer, U., Frey, K., Haft, H. & Kuebart, F. (Eds.). (1986). *Curriculum research in Europe*. Berwyn & Lisse, Netherlands: Swets North America Inc./Swets & Zeitlinger B.V.
- Hamilton, D. (1990). *Curriculum history*. Geelong, Australia: Deakin University Press.
- Heckhausen, H. (1972). Discipline et interdisciplinarité. In L. Apostel, G. Berger, A. Briggs & G. Michaud (Eds.), *L'interdisciplinarité. Problèmes d'enseignement et de recherche dans les universités* (pp. 83-90). Paris, France: Organisation de coopération et de développement économiques, Centre pour la recherche et l'innovation dans l'enseignement.
- Hellgren, P. (1993a). *Developing academic professionals through the Finnish teacher education curriculum*. Paper presented at the Annual Meeting of the American Educational Research Association (AERA), San Francisco, CA, April 20-24.
- Hellgren, P. (1993b). What is the epistemological identity of subject-specific didactics in Finland? In L. Montero Mesa & J. M. Vez Jeremias (Eds.), *Las didácticas específicas en la formación del profesorado* (pp. 571-577). Santiago de Compostela, Spain: Tórculo Ediciones.
- Hellgren, P. (1993c). *The dialectic of school curriculum and teacher education*. Paper presented at the 13th Annual International Seminar for Teacher Education (ISTE), Steinbach-Comburg, Germany, April 21-23.
- Hermerén, G. (1985). Interdisciplinarity revisited – Promises and problems. In L. Levin & I. Lind (Eds.), *Interdisciplinarity revisited: Re-assessing the concept in the light of institutional experience* (pp. 15-25). Stockholm, Sweden: OECD/CERI, Swedish National Board of Universities and Colleges, Linköping University.
- Hofstadter, D. (1985). *Gödel, Escher, Bach. Les brins d'une guirlande éternelle*. Paris, France: InterÉditions.
- Hopmann, S. (1992). *Starting a dialogue. Roots and issues of the beginning conversation between European didaktik and the American curriculum tradition*. Paper presented at the Annual Meeting of the American Educational Research Association (AERA), San Francisco, CA, April.
- Hopmann, S. & Riquarts, K. (1995). Starting a dialogue: Roots and issues in the beginning conversation between the didaktik and curriculum traditions. *Journal of Curriculum Studies*, 27, 3-12.
- Hörner, W. (1986). Curriculum research in France and Luxemburg. In U. Hameyer, K. Frey, H. Haft & F. Kuebart (Eds.), *Curriculum research in Europe* (pp. 91-107). Berwyn & Lisse, Netherlands: Swets North America Inc./Swets & Zeitlinger B.V.
- Houssaye, J. (1997). Spécificité et dénégation de la pédagogie. *Revue française de pédagogie*, 120, 83-97.

- Huber, L. (1992). Editorial. *European Journal of Education*, 27(3), 193-199.
- Jackson, P.W. (1968). *Life in classrooms*. New York, NY: Holt, Rinehart & Winston.
- Jackson, P.W. (1992). Conceptions of curriculum and curriculum specialists. In P. W. Jackson (Ed.), *Handbook of research on curriculum. A project of the American Educational Research Association* (pp. 3-40). New York, NY: Macmillan.
- Jacobs, H.H. (1989). The growing need for interdisciplinary curriculum content. In H. H. Jacobs (Ed.), *Interdisciplinary curriculum: Design and implementation* (pp. 1-11). Alexandria, VA: Association for Supervision and Curriculum Development.
- Kherroubi, M. & Plaisance, É. (2000). Les évolutions de l'enseignement du premier degré en France. In A. van Zanten (Ed.), *L'école. L'état des savoirs* (pp. 26-34). Paris, France: La découverte.
- Kintzler, C. (1989). Fonder l'école républicaine dans une cité laïque. In Condorcet (M.J.A. Caritat, marquis de), *Écrits sur l'instruction publique*. Vol. I: *Cinq mémoires sur l'instruction publique* (Text presented, annotated and commented on by Charles Coutel & Catherine Kintzler, pp. 9-20). Paris, France: Édilig (1<sup>st</sup> ed. 1791-1792).
- Klafki, W. (1995). Didactic analysis as the core of preparation of instruction. *Journal of Curriculum Studies*, 27(1), 13-30.
- Klafki, W. (1998). Characteristics of critical-constructive didaktik. In B.B. Gundem & S. Hopmann (Eds.), *Didaktik and/or curriculum* (pp. 307-330). New York, NY: Peter Lang.
- Klein, J.T. (1985). The interdisciplinary concept: Past, present and future. In L. Levin & I. Lind (Eds.), *Interdisciplinarity revisited: Re-assessing the concept in the light of institutional experience* (pp. 104-136). Stockholm, Sweden: OECD/CERI, Swedish National Board of Universities and Colleges, Linköping University.
- Klein, J. T. (1990). *Interdisciplinarity: History, theory, and practice*. Detroit, MI: Wayne State University Press.
- Klein, J. T. (1996). *Crossing boundaries. Knowledge, disciplinarity, and interdisciplinarity*. Charlottesville, VA: University Press of Virginia.
- Klein, J. T. (1998). L'éducation primaire, secondaire et postsecondaire aux États-Unis: vers l'unification du discours sur l'interdisciplinarité. *Revue des sciences de l'éducation*, XXIV(1), 51-74.
- Klein, J. T. (2002). Introduction. Interdisciplinarity today: Why? What? And how? In J. T. Klein (Ed.), *Interdisciplinarity education in K-12 and college: A foundation for K-16 dialogue* (pp. 1-17). New York, NY: The College Board.
- Klein, J.T. (Ed.). (2005). *Humanities, culture, and interdisciplinarity. The changing American academy*. New York, NY: State University of New York Press.
- Klein, J.T. (2010). A taxonomy of interdisciplinarity. In R. Frodeman, J.T. Klein & C. Mitcham (Eds.), *The Oxford handbook of interdisciplinarity* (pp. 3-14). Oxford, UK: Oxford University Press.
- Klein, J. T. & Newell, W. H. (1996). Advancing interdisciplinary studies. In J.G. Gaff, J. L. Ratcliff & Associates, *Handbook of the undergraduate curriculum. A comprehensive guide to purposes, structures, practices, and change* (pp. 393-415). San Francisco, CA: Jossey-Bass.



- Kliebard, H. M. (1975). Reappraisal: The Tyler rationale. In W. F. Pinar (Ed.), *Curriculum theorizing: The reconceptualists* (pp. 70-83). Berkeley, CA: McCutchan.
- Kliebard, H. M. (1986). *The struggle for the American curriculum: 1893-1958*. Boston, MA: Routledge & Kegan Paul.
- Kliebard, H. M. (1988). Dewey and the Herbartians: The genesis of a theory of curriculum. In W. F. Pinar (Ed.), *Contemporary curriculum discourses* (pp. 66-79). Scottsdale, AZ: Gorsuch Scarisbrick.
- Kliebard, H. M. (1992a). *Forging the American curriculum. Essays in curriculum history and theory*. New York, NY-London, UK: Routledge.
- Kliebard, H. M. (1992b). Constructing a history of the American curriculum. In P.H. Jackson (Ed.), *Handbook of research on curriculum. A project of the American Educational Research Association* (pp. 157-184). New York, NY: Macmillan.
- Kockelmans, J.J. (1979). Science and discipline. Some historical and critical reflections. In J.J. Kockelmans (Ed.), *Interdisciplinarity and higher education* (pp.11-45). Philadelphia, PA: The Pennsylvania State University Press.
- Kridel, C. (Ed.). (1989). *Curriculum history: Conference presentations from the Society for the Study of Curriculum History*. Landham, MD: University Press of America.
- Kuhn, T.S. (1972). *La structure des révolutions scientifiques*. Paris, France: Flammarion (1<sup>st</sup> ed. 1970).
- Lelièvre, C. (1994). De Condorcet à Ferry et de Ferry à Condorcet — Exposé. In J. Dumazedier & É. Donfu (Eds.), *La leçon de Condorcet. Une conception oubliée de l'instruction pour tous nécessaire à une république* (pp. 49-60). Paris, France: L'Harmattan.
- Le Moigne, J.-L. (1984). *La théorie du système général. Théorie de la modélisation*. Paris, France: Presses universitaires de France.
- Lenoir, Y. (1993). Entre Hegel et Descartes: de quels sens peut-il être question en didactique? In P. Jonnaert & Y. Lenoir (Eds.), *Sens des didactiques et didactique du sens* (pp. 29-99). Sherbrooke, PQ, Canada: Éditions du CRP.
- Lenoir, Y. (1996). Médiation cognitive et médiation didactique. In C. Raisky & M. Caillot (Eds.), *Le didactique au-delà des didactiques. Débats autour de concepts fédérateurs* (pp. 223-251). Brussels, Belgium: De Boeck Université.
- Lenoir, Y. (2002). Les réformes actuelles de la formation à l'enseignement en France et aux États-Unis: éléments de mise en perspective socio-historique à partir du concept d'éducation. *Revue suisse des sciences de l'éducation*, 24(1), 91-128.
- Lenoir, Y. (2014). *Les médiations au cœur des pratiques d'enseignement-apprentissage: une approche dialectique. Des fondements à leur actualisation en classe. Éléments pour une théorie de l'intervention éducative*. Longueuil, PQ, Canada: Groupéditions Éditeurs.
- Lenoir, Y. & Bouillier-Oudot, M.-H. (Eds.). (2006). *Savoirs professionnels et curriculum de formation*. Québec, PQ, Canada: Presses de l'Université Laval.
- Lenoir, Y. & Hasni, A. (2006). Les disciplines, la didactique des disciplines et le curriculum de formation à l'enseignement primaire: de la maîtrise à l'adéquation. In Y. Lenoir & M.-H. Bouillier Oudot (Eds.), *Savoirs professionnels et*



- curriculum de formation* (pp. 125-166). Québec, PQ, Canada: Presses de l'Université Laval.
- Lenoir, Y. & Hasni, A. (2010). Interdisciplinarity in Quebec schools: 40 years of problematic implementation. *Issues in Integrative Studies*, 28, 238-294.
- Lenoir, Y. & Klein, J. (Eds.). (2010). Interdisciplinarity in schools: A comparative view of national perspectives. *Issues in Integrative Studies*, 28, 1-331.
- Lenoir, Y. & Tupin, F. (2012). Introduction: Instruction et socialisation, deux notions à clarifier. In Y. Lenoir & F. Tupin (Eds.), *Les pratiques enseignantes entre instruire et socialiser. Regards internationaux* (pp. 1-62). Québec, PQ, Canada: Presses de l'Université Laval.
- Léon, A. (1971). De la Révolution française aux débuts de la III<sup>e</sup> République. In M. Debesse & G. Mialaret (Eds.), *Traité des sciences pédagogiques*. Vol. 2: *Histoire de la pédagogie* (pp. 331-378). Paris, France: Presses universitaires de France.
- Libâneo, J. C. (2000). *Didática*. São Paulo, Brazil: Cortez.
- Libâneo, J. C. (2013). Didática como campo investigativo e disciplinar e seu lugar na formação de professores no Brasil. In M. R. S. Oliveira & J. A. Pacheco (Eds.), *Currículo, didática e formação de professores* (pp. 131-166). Campinas, Brazil: Papirus Editora.
- Lynton, E. A. (1985). Interdisciplinarity: Rationales and criteria of assessment. In L. Levin & I. Lind (Eds.), *Interdisciplinarity revisited: Re-assessing the concept in the light of institutional experience* (pp. 15-25). Stockholm, Sweden: OECD/CERI, Swedish National Board of Universities and Colleges, Linköping University.
- Macpherson, C.B. (1962). *The political theory of possessive individualism: Hobbes to Locke*. London, UK: Oxford University Press.
- Margolinas, C. (1993). *De l'importance du vrai et du faux dans la classe de mathématiques*. Grenoble, France: La Pensée sauvage.
- Matsuura, K. (2000). *La protection de la diversité culturelle dans une économie en voie de mondialisation*. 30th General Conference of the Canada-France Interparliamentary Association. Lecture by the Director-General of UNESCO, Paris, France, September 12.
- Messer-Davidow, E., Shumway, D. R. & Sylvan, D. J. (1993). *Knowledges. Historical and critical studies in disciplinarity*. Charlottesville, VA: University of Virginia Press.
- Mollo-Bouvier, S. (1986). *La sélection implicite à l'école. Pratiques du discours et discours de la pratique*. Paris, France: Presses universitaires de France.
- Morf, A. (1972). La formation des connaissances et la théorie didactique. *Dialectica*, 26(2), 103-114.
- Morf, A., Grize, J.-B. & Pauli, L. (1969). Vers une pédagogie scientifique. *Dialectica*, 23(1), 24-31.
- Moran, J. (2010). *Interdisciplinarity* (2<sup>nd</sup> ed.). London, UK: Routledge (1<sup>st</sup> ed. 2002).
- Morin, E. (1977). *La méthode*. T. 1: *La nature de la nature*. Paris, France: Seuil.
- Morin, E. & Piattelli-Palmarini, M. (Eds.). (1974). *L'unité de l'homme. Invariants biologiques et universaux culturels*. Paris, France: Seuil.
- Moroni, A. (1978). Interdisciplinarité en éducation environnementale. *Perspectives: Revue trimestrielle de l'éducation*, VIII(4), 528-542.
- Munro, P. (1998). Engendering curriculum history. In W. P. Pinar (Ed.), *Curriculum*

- toward new identities* (pp. 263-294). New York, NY: Garland.
- Neurath, O. (1938). Unified science as encyclopedic integration. In R. Bohr, R. Carnap, J. Dewey, C. W. Morris, O. Neurath & B. Russell, *International encyclopedia of unified science* (Vol. 1, pp. 1-27). Chicago, IL: The University of Chicago Press.
- Newell, W. H. (1990). Interdisciplinary curriculum development. *Issues in Integrative Studies*, 8, 69-86.
- Newell, W. H. (1998). Interdisciplinary curriculum development. In W.H. Newell (Ed.), *Interdisciplinarity. Essays from the literature* (pp. 51-65). New York, NY: The College Board.
- Newell, W. H. (2001). A theory of interdisciplinary studies. *Issues in Integrative Studies*, 19, 1-26.
- Newman, J. H. (1907). *The idea of a university: Defined and illustrated*. London, UK: Longmans, Green & Co (1<sup>st</sup> ed. 1852). Retrieved from <http://www.newmanreader.org/works/idea/index.html#contents>
- Newman, J. H. (1909). *Historical sketches*. Vol. 3: Rise and progress of universities. London, UK: Longmans, Green & Co (1<sup>st</sup> ed. 1872). Retrieved from <http://www.newmanreader.org/works/historical/volume3/index.html#titlepage>
- Niess, M. & Gillow-Wiles, H. (2013). Advancing K-8 teachers' STEM education for teaching interdisciplinary science and mathematics with technologies. *Journal of Computers in Mathematics and Science Teaching*, 32(2), 219-245.
- Nique, C. & Lelièvre, C. (1993). *La République n'éduquera plus*. Paris, France: Plon.
- Overly, N. (1970). *The unstudied curriculum: Its impact on children*. Washington, DC: Association for Supervision and Curriculum Development (ASCD), Elementary Education Council.
- Palmade, G. (1977). *Interdisciplinarité et idéologies*. Paris, France: Anthropos.
- Passos Alencastro Veiga, I. (1988). *Repensando a didática*. Campinas, Brazil: Papyrus Editora.
- Passos Alencastro Veiga, I. (Ed.). (1996). *Didática: o ensino e suas relações*. Campinas, Brazil: Papyrus Editora.
- Passos Alencastro Veiga, I. (2002). *A prática pedagógica do professor de didática*. Campinas, Brazil: Papyrus Editora.
- Perrenoud, P. (1984). *La fabrication de l'excellence scolaire: du curriculum aux pratiques d'évaluation*. Geneva, Switzerland: Droz.
- Perrenoud, P. (1994a). Curriculum: le formel, le réel et le caché, In J. Houssaye (Ed.), *La pédagogie: une encyclopédie pour aujourd'hui* (2<sup>d</sup> ed.). Paris, France: ESF (1<sup>st</sup> ed. 1993).
- Perrenoud, P. (1994b). *Métier d'élève et sens du travail scolaire*. Paris, France: ESF.
- Perrenoud, P. (1997). *Pédagogie différenciée: des intentions à l'action*. Paris, France: ESF.
- Perret, J.-F. & Perrenoud, P. (Eds.). (1990). *Qui définit le curriculum, pour qui? Autour de la reformulation des programmes de l'école primaire en Suisse romande*. Cousset, Switzerland: Delval.
- Piaget, J. (1967). Les courants de l'épistémologie scientifique contemporaine. In J. Piaget (Ed.), *Logique et connaissance scientifique* (pp. 1225-1271). Paris, France: Gallimard.

- Piaget, J. (1971). La causalité selon E. Meyerson. In M. Bunge, F. Halbwachs, T. S. Kuhn & L. Rosenfeld, *Les théories de la causalité* (pp. 151-208). Paris, France: Presses universitaires de France.
- Pinar, W.F. (Ed.). (1998a). *Curriculum. Toward new identities*. New York, NY: Garland Publishing.
- Pinar, W.F. (1998b). Dreamt into existence by others: Notes on school reform in the US. In M. Tardif, C. Lessard & C. Gauthier (Eds.), *Formation des maîtres et contextes sociaux. Perspectives internationales* (pp. 201-229). Paris: Presses universitaires de France.
- Pinar, W. F., Reynolds, W. M., Slattery, P. & Taubman, P. M. (1995). *Understanding curriculum. An introduction to the study of historical and contemporary curriculum discourses*. New York, NY: Peter Lang.
- Pratt, D. & Short, E. C. (1994). Curriculum management. In T. Husén & T. N. Postlethwaite (Eds.), *The international encyclopedia of education* (2<sup>nd</sup> ed., Vol. 3, pp. 1320–1325). Oxford, UK: Pergamon Press.
- Ratcliff, J. L. (1997). What is a curriculum and what should it be? In J.G. Gaff & J.L. Ratcliff (Eds.), *Handbook of the undergraduate curriculum. A comprehensive guide to purposes, structures, practices, and change* (pp. 5-29). San Francisco, CA: Jossey-Bass Publishers.
- Raisky, C. (1996). Doit-on en finir avec la transposition didactique? Essai de contribution à une théorie didactique. In C. Raisky & M. Caillot (Eds.), *Au-delà des didactiques, le didactique. Débats autour de concepts fédérateurs* (pp. 37-59). Brussels, Belgium: De Boeck Université.
- Repko, A. F. (2012). *Interdisciplinary research. Process and theory* (2<sup>nd</sup> ed.). Los Angeles, CA: Sage.
- Repko, A. F., Szostak, R. & Phillips Buchberger, M. P. (2014). *Introduction to interdisciplinary studies*. Thousand Oaks, CA: Sage.
- Reuter, Y. (Ed.). (2010). *Dictionnaire des concepts fondamentaux des didactiques*. Bruxelles, Belgium: De Boeck.
- Ropé, F. (2000). Savoirs, savoirs scolaires et compétences. In A. van Zanten (Ed.), *L'école. L'état des savoirs* (pp. 161-169). Paris, France: La découverte.
- Rudolph, F. (1977). *Curriculum. A history of the American undergraduate course of study since 1636*. San Francisco, CA: Jossey-Bass.
- Sachot, M. (2000). La formation professionnelle à l'enseignement entre deux vecteurs intégrateurs: les disciplines et le curriculum. *Éducation et francophonie*, XXVIII(2). Retrieved from <http://www.acelf.ca/revue/>
- Sachot, M. (2004). *Disciplines du maître, disciplines de l'élève: contre une "disciplinarisation" du primaire*. In M. Sachot & Y. Lenoir (Eds.), *Les enseignants du primaire entre disciplinarité et interdisciplinarité: quelles formations didactiques?* (pp. 19-33). Québec, PQ, Canada: Presses de l'Université Laval.
- Schnapper, D. (1994). *La communauté des citoyens. Sur l'idée moderne de nation*. Paris, France: Gallimard.
- Schneuwly, B. (1990). Didaktik/Didactiques. *Éducation et recherche*, 12(3), 213-220.
- Schubert, W. (1986). *Curriculum: Perspective, paradigm, and possibility*. New York, NY: Macmillan.

- Servier, J. (1967). *Histoire de l'utopie*. Paris, France: Gallimard.
- Short, E. C. (1986). A historical look at curriculum design. *Theory into Practice*, 25(1), 3-9.
- Sinacœur, M. A. (1983). Qu'est-ce que l'interdisciplinarité? In L. Apostel, J.-M. Benoist, T. B. Bottomore, K. E. Boulding, M. Dufrenne, M. Eliade, C. Furtado, G. Gusdorf, D. Krishna, W.J. Mommsen, E. Morin, M. Piatteli-Palmarini, M. A. Sinacœur, S.N. Smirnov & J. Ui, *Interdisciplinarité et sciences humaines* (Tome I, pp. 21-29). Paris, France: Unesco.
- Spinoza, B. (1990). *Éthique* (Trans. Robert Misrahi). Paris, France: Presses universitaires de France (1<sup>st</sup> ed. 1677).
- Sirota, R. (1993). Le métier d'élève. *Revue française de pédagogie*, 104, 85-108.
- Squire, S.J. (1995). Travels in interdisciplinarity: Exploring integrative cultures, contexts and change. *Issues in Integrative Studies*, 13, 79-99.
- StateUniversity.com Civics and citizenship education. A national education goal, formal instruction, the informal curriculum, concerns and issues, improving civic education. In *Education encyclopedia* (n.d.). Retrieved from <http://education.stateuniversity.com/pages/1831/Civics-Citizenship-Education.html>
- Stengers, I. (1993). *L'invention des sciences modernes*. Paris, France: La Découverte.
- Stengers, I. (1997). *La guerre des sciences. Cosmopolitiques I*. Paris, France: La Découverte/Les empêcheurs de penser en rond.
- Stichweh, R. (1991). *Études sur la genèse du système scientifique moderne* (Trans. F. Blaise). Lille, France: Presses universitaires de Lille.
- Stone, D. A. (2014). Beyond common grounds. A transdisciplinary approach to interdisciplinary communication and collaboration. In M. O'Rourke, S. Crowley, S. D. Eigenbrode & J. D. Wulforth (Eds.), *Enhancing communication & collaboration in interdisciplinary research* (pp. 82-102). Los Angeles, CA: Sage.
- Tanner, D. & Tanner, L. (1990). *History of the school curriculum*. New York, NY-London, UK: Macmillan/Collier Macmillan.
- Tanner, D. & Tanner, L. (1995). *Curriculum development. Theory into practice* (3<sup>rd</sup> ed.). Upper Saddle River, NJ: Prentice-Hall (1<sup>st</sup> ed. 1975).
- Tochon, F. (1999). Didactics in the francophone world. *Instructional Science*, 1-4, 1-192.
- Tyler, R. (1949). *Basic principles of curriculum and instruction*. Chicago, IL: University of Chicago Press.
- van Zanten, A. (2000). Un libéralisme éducatif sans frontières? In A. van Zanten (Ed.), *L'école. L'état des savoirs* (pp. 355-364). Paris, France: La découverte.
- Vars, G. F. (1993). *Interdisciplinary teaching: Why & how*. Columbus, OH: National Middle School Association.
- Venezky, R. L. (1992) Textbooks in school and society. In P. W. Jackson (Ed.), *Handbook of research on curriculum. A project of the American Educational Research Association* (pp. 436-461). New York, NY: Macmillan.
- Wallin, E. (1988). Notes on didactics as a field of research. *Scandinavian Journal of Educational Research*, 32(1), 1-7.
- Weingart, P. (2010). A short history of knowledge formations. In R. Frodeman, J.T. Klein & C. Mitcham (Eds.), *The Oxford handbook of interdisciplinarity* (pp. 3-14). Oxford, UK: Oxford University Press.

- Westbury, I., Doyle, W. & Künzli, R. (1993). *The German didactic tradition: Implications for pedagogical research*. Champaign, IL: University of Illinois at Urbana-Champaign.
- Wineburg, S. & Grossman, P. (2000). *Interdisciplinary curriculum. Challenges to implementation*. New York, NY: Teachers College Press.
- Whitehead, A.N. (1929). *The aims of education*. London, UK: Williams & Norgate.
- Willis, G., Schubert, W., Bullough, R., Kridel, C. & Holton, J. (Eds.). (1993). *The American curriculum: A documentary history*. Westport, CT: Greenwood.