MATHEMATICS TEACHER'S KNOWLEDGE AND PROFESSIONAL DEVELOPMENT IN THE CONTEXT OF MULTI- AND INTERCULTURAL EDUCATION

Nicole Carignan

University of Quebec, Montreal, Canada

This paper aims to reflect on mathematics teachers' knowledge and professional development in the context of multi- and intercultural education. Teachers' knowledge and professional development are connected to their sociocultural representations on ethnic/cultural diversity. Therefore, what are the mathematics teachers' knowledge and professional development and their sociocultural representations on ethnic and cultural diversity? In addition, how is it possible to integrate teaching/learning strategies with a multi- and intercultural responsive approach? Then, the purpose of this ongoing study is to develop a theoretical framework that considers the impact of teachers' sociocultural representations on the mathematics teacher's knowledge and professional development in the context of multi- and intercultural perspectives in education. At the end, we will present the methodology of the study.

OBJECTIVES

This paper aims to reflect on mathematics teachers' knowledge and professional development in the context of multi- and intercultural education. Teachers' knowledge and professional development are connected to their sociocultural representations on ethnic/cultural diversity. Therefore, some questions emerged. What are the mathematics teachers' knowledge and professional development and their sociocultural representations on ethnic and cultural diversity? What is the relation between them? Consequently, how is it possible to integrate teaching/learning strategies with a multi- and intercultural responsive approach? Then, this ongoing study aims to develop a theoretical framework that considers the impact of teachers' sociocultural representations on the mathematics teacher's knowledge and professional development in the context of multi- and intercultural perspectives in education.

CONTEXT OF THE STUDY

In order to fulfill our goals we review the context of the research in multi- and intercultural education. In Canada, 80% of non-traditional immigration in 1997 is from Asia, Central and South America, and Africa compared to 20 % in 1977 (McAndrew, 2001). According to the 2001 census, 47% of Canadians have at least one ethnocultural group in their background other than British, Canadian or French. One estimates that, by 2016, visible minorities will account for 20% of the Canadian population. A survey of the ethnocultural diversity of some metropolitan areas shows that population born abroad is increasing. For example, in Paris, 17% of the population is born abroad. It is 18% for Montreal, 27% for Brussels, 28% for London (GB), 31% for Jerusalem (Israel) and Sydney (Australia), 32 % for San Francisco, 34% for New York, 36% for Tel Aviv (Israël), 39% for Vancouver, 45% for Toronto, 47% for Amsterdam, and 51% for Miami (Benton-Short, Price & Friedman, 2005).

Are teachers ready to teach in such a context and equipped to face this challenge? Multicultural concern emphasizes the recognition of cultural and ethnic diversity for a more equitable society. In what follows, we describe the multidimensionality of research in multi- and intercultural education regarding curriculum reform, pedagogical and societal equity, and teachers' social competency (Bennett, 2001; McAndrew, 2001).

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The first step to meet our goals is to look at the literature on characteristics of mathematics education, teachers' sociocultural representations, nature of multi- and intercultural education as well as teachers' knowledge professional development.

Characteristics of mathematics education. Mathematics content knowledge reflects the principle of hierarchy (some knowledge is more valuable than the others) and visibility (western contributions are more recognized than non-western one), which contribute to the understanding of universality (Preiswerk & Perrot, 1975; Arcand & Vincent, 1981; Akkari, 2000). However, Banks (1999) and Rossatto (2005) among others defend the position of a curriculum for liberation in which teacher invites students to learn to take action in a transformative environment. Related to mathematics education, Atweh, Forgasz & Nebres (2001) re-question the fact that mathematics is not a universal language or culture-free subject matter seen as a finished product to be memorized.

In a similar way, Zaslavsky (1987) presented mathematics as a system of thinking, organizing, and creating the world. Consequently, **mathematics education** should bring awareness to students that Europe is not now and nor was it ever the center of civilization. It challenges the ethnocentric assumption that mathematics is largely a product of the intellectual work of men of European descent. Therefore, mathematics can be used to develop students' knowledge of and appreciation for world cultures and traditions. Sociocultural aspects of mathematics education shows minority students that all social groups have contributed to the body of knowledge they learn in mathematics class. It investigates the idea of accessibility to high levels of mathematics for students from historically underrepresented groups dealing with mathematics as a "critical filter" to the university and to many fields of study and careers (Belkhir, Yarnevich, Shirley & Charlemaine, 1995). It also tends to raise "the achievement of girls and of students from sociocultural groups who [are traditionally] on the average lag behind in mathematics." (Sleeter, 1997, p. 682)

Seen as mathematics that belong to people, ethnomathematics connect with social issues and help students to learn to use it as a tool to address social justice issues of concern to them (D'Ambrosio, 1990; Franskenstein, 1990). In that sense, Moses & Cobb (1999) point out that differential access to algebra in the U.S. public schools should be seen as a systemic form of discrimination because the ability to master mathematics and its accessibility serve as a guaranty to protect civil rights. We proposed to reflect on the existence of diverse forms of mathematics (content knowledge), ethnomathematics (mathematics belongs to people), but also of diverse ways of doing mathematics (diversity of systems). Moreover, these authors encourage the inclusion of a variety of mathematics relevant content in the school curriculum and a full understanding of the universal nature and power of mathematics.

Teachers' sociocultural representations. According to Jodelet (1991), social representation is common sense knowledge transmitted, learned, socially shared and built through

experiences and ways of thinking that aim to organize practices, actions, and ways of communicating. It also helps to establish the vision of participating in a community, structure the symbolic process in relation to a social interaction (Doise, 1990), and connect to a collective and cultural representation. The sociocultural imprint of content and processes of representation refers to the conditions and contexts in which they emerge to the functions they serve (Martin Sanchez, 2000). As a referential based on values, it justifies actions that give an opportunity to transform, reorganize, and re-structure one's environment (Moscovici & Abric, 1984; Abric, 1994; Dubet, 1994).

Arguing the complexity of the relationship between practices and social representations Rouquette (2000) points out three aspects: 1) social representations contribute to the historical aspect of the current time instead of focusing on technical operations; 2) while representations enact as a condition of practices, practices enact as change agents of representations; and, 3) practices that impact on social representations invites to action. They could be considered a collective and cultural representation shared with other teachers (Gigling, 2001). Referring to the world of education, Hatala (2003) showed that teachers' sociocultural representations are present before their teacher education training and remain in their professional activities. In the framework of the research, sociocultural representations can be understood as something teachers believe, consider true regarding their ethnocultural background and sociocultural experiences (Lebrun, 2001; Carignan, Sanders & Pourdavood, 2005).

Nature of multi- and intercultural education. Stemming from the 1960s' civil rights movement, multicultural education in North America sought to recognize ethnocultural differences for a more equitable society. On the other hand, intercultural education emphasizes on similarities regarding mutual respect, exchange, interdependency, and reciprocity (LaL, 2004). In the field of multi- and intercultural education, critical analysis has been done on curriculum reform, equity, and teachers' sociocultural competency.

First of all, Banks' curriculum reform studies (1999) reveal women and ethnic groups' contributions in numerous fields as well as analyze the gap between curriculum theory, pedagogical practices, and teacher education models.

Then, studies on equity pedagogy show that both socioeconomically unprivileged and racially marginalized students (Pollock, 2001) become dropouts, suspended, and expulsed unfairly from schools. These studies on equity focus on the impact of school actors' attitudes and expectations, the climate of school and classroom, and cultural styles in teaching and learning on students' achievement. Armaline (1995) recognizes the cultural clash between social values (the students' and parents' background) and school values (administrators' and teachers' expectations) and among them.

In addition, the individual who is multi- and interculturally competent can communicate and empathize with somebody who is socioculturally, ethnically, and economically different. This person is open to cultural differences, aware of his/her own ethnocultural background, and value differences as well as similarities. This person is open to cultural differences, aware of his/her own cultural background, and able to deconstruct mechanisms of discrimination.

While *multiculturality* promotes positive attitudes regarding diversity or cultural pluralism, *interculturality* refers to reciprocity and the ability of sharing a common and inclusive civic space (Moodley 1988; Pagé, 1988, McAndrew, 1990; Ouellet, 1991). Interculturality also considers multidimensional identities and dynamic transformations including dialectic diversity-universality and recognition of the subjective individual presents in the cultural and the social spheres. Among others, Abdallah-Pretceille (1988), Camilleri & Cohen-Emerique (1989), and Berthelot (1990) propose to shift away from the paradigm of recognizing diversity and differences to the one of communicating similarities and of learning to live together.

Teachers' knowledge and professional development. Although a growing body of rich thinking links mathematics education, multi- and intercultural education, and teacher education (Sleeter, 1997), little guidance about how to help teachers connect these areas is available. That's why this proposal aims to include a theoretical framework for teaching and learning strategies that are socioculturally and economically responsive. We aim to examine the characteristics of teachers' sociocultural representations for a sustainable teachers' professional development through the use of critical reflection. Seen as a system of thinking, organizing, and creating the world, multi- and intercultural education challenge the idea of accessibility to high levels of knowledge for students from historically underrepresented groups.

For Sanders & Carignan (2003) knowledge belongs to people experiences, connects with social issues and helps students to use it as a tool to address social justice to them. Time needs to be set aside specifically for professional dialogue, which in turn, develops critical reflection. As educators, it must be kept in mind for results to occur, critical reflection through professional dialogue has to start with authentic issues that teachers have, the concerns, ideas, questions and celebrations they have (Wlodarsky, 2005). That being said, this reflection on school actors' social representations in the context of multi- and intercultural education demonstrates our ongoing preoccupation regarding this issue. We also like to refer to Schön's definition (1990, 1987) of reflective practice as thoughtfully considering one's own experiences in applying knowledge to practice while being coached by professionals in the discipline.

METHODOLOGY

This study is embedded in a socioconstructivist inquiry paradigm that refers to relativism that assumes that realities are "multiple, intangible mental constructions, socially and experientially based, local and specific in nature […], and dependent for their form and content on the individual persons or groups holding the constructions." (Guba & Lincoln, 1994, p. 111) These constructions can be seen as "created realities […] using a process that is rooted in the previous experience, belief systems, values, fears, prejudices, hopes, disappointments, and achievements of the constructor. [Constructions happen when the] knower interacts with the already known and the still-knowable or to-be-known." (Guba & Lincoln, 1989, p. 143) "Subjectively, the constructor/investigator and the object of construction/investigation assumed that "the 'findings' are literally created as the investigation proceeds. [Methodologically, it refers to hermeneutical and dialectical analysis where] individual constructions can be elicited and refined only through interaction *between and among* investigator and respondents." (Guba & Lincoln, 1994, p. 111)

Selection of the school' knowledge. We presented our project to principals of primary and secondary schools located at Montreal School Board where contrasting public schools range from socio-economically privileged to very unprivileged schools, and challenge with recent and old immigration. The criteria are the willingness to participate, the socioeconomic/sociocultural diversity, the size, and the fact that mathematics is taught.

Selection of the participants. The criteria are the participants' willingness to participate, their availability, and the facility to express their thoughts. We are interested in either full- or part-time in-service teachers teaching mathematics, preferably one for each grade. We are also interested in selecting other school actors (principals, students as well as their parents) including those who come from different ethnic/cultural backgrounds.

Data collection. Related to our goals and conceptual perspectives, this qualitative research is observational, descriptive, analytical, and pragmatic (Van der Maren, 1995) for a better understanding of the interactions in the classroom situation. In order to realize the **first goal**, which is to describe teachers' pedagogical strategies, we will observe classrooms (Laperrière, 2003) with short discussions before and after. We will elaborate a paper and electronic checklists as components of field notes (Crespo, Carignan & Kandarakis, 1997). For mathematics lessons, we will refer to the models for understanding teacher-student interactions (Hufferd-Ackles, Fuson, & Sherin, 2004; Bednarz & Giroux, in press). We will prepare semi-open questions for interviews, including teachers' sociocultural and socioeconomic backgrounds, worldviews, attitudes, and beliefs regarding ethnical/cultural diversity, didactic material, program, school, parents, and students. After the classroom observation, we will conduct interviews with teachers (Boutin, 1997; Savoie-Zajc, 2003), which will be recorded and last about one hour. We will manage complementary one-to-one interviews with each principal as well as focus group interviews (Geffrion, 2003; Vaughn, Schumm & Sinagub, 1996) with parents and students. We will also aim to analyze the content of school documents, pedagogical material, lesson plans, students' school works and home works (L'Écuyer, 1988). We will take field notes and discuss among research team members and teachers about an adequate type of lesson. In order to realize the **second goal**, which is to identify what emerges from pedagogical strategies in relation to teachers' social representations, we will analyze the data we collected previously. For the **third goal**, which is to develop a theoretical framework, we will focus on the analysis of the relationship between teachers' social representations and their strategies.

Data analysis. In the context of naturalistic inquiry, data analysis is not deductive but rather open-ended and inductive. Because the product of data cannot be known in advance, "the data cannot be specified at the beginning of the inquiry." (Lincoln & Guba, 1985, p. 224) [The strategy of inquiry makes a sound meaning of the data in order to] "facilitate the continuing unfolding of the inquiry [and] understand the phenomenon in its context." (p. 225) The purpose of narrative research is to show human existence in action in a particular context that emerges through the interactions of a person's previous learning and experiences, present situated interests, and proposed goals and purposes (Hatch & Wisniewski, 1995). Data-analytic procedures are a relevant technique for providing conclusive and significant findings because they should be able to answer the questions posed.

In order to **understand teachers' social representations** from the data we collected, we will analyze the content of these data, which is a form of empirical qualitative research that generally refers to any data that are in the form of natural speech (Sabourin, 2003). This analysis will depend on quotes from the participants, document and material content, and field notes to support our choice of themes to be examined. Themes emerged from the voices of participants or from ways that the themes are stated that make them seem significant to us. Similarities and differences are influenced by the context of the participants' personal, sociocultural/economical, and professional experiences. Consequently, we classify provisory data, organize semantic categories (Deslauriers, 1991), and analyze it from a particular to a more general category. As the study progresses, "theoretical insights and linkages between categories increase, making the process exciting as 'what is going on' finally becomes clearer and more obvious. Data collection and sampling are dictated by and become directed entirely toward the emergent model. The researcher seeks indices of saturation, such as repetition (occurrence and co-occurrence) in the information obtained and confirmation of previously collected data. Using theoretical sampling, the researcher looks for negative cases to enrich the emergent model and to explain all variations and diverse patterns." (Morse, 1994, p. 230) Each component of data analysis is dependent on the characteristics of all preceding elements and their development. The interpretation yields many themes, which plan the triangulation among the researchers (Denzin, 1984) including student future researchers.

In order to identify what emerges from **teaching/learning strategies connected to teachers' social representations** on ethnic/cultural diversity, we will examine teaching/learning strategies as they were observed in mathematics classroom towards the model of data analysis proposed above. The Hufferd-Ackles et al. model (2004) will provide us with a four-strategy classification for both mathematics and music classroom interactions: 1) traditional teacher-directed classroom with brief answer responses from students; 2) teacher beginning to pursue student thinking; 3) teacher modeling and helping students build new roles; and 4) teacher fully engaged as a co-teacher as well as a co-learner. Because this model focuses on the interaction with students that the teacher initiates on a specific task, it will provide us a possibility to examine through the teaching/learning strategies we observed how to identify some teachers' social representations on ethnic/cultural diversity. Through the observation of pedagogical strategies used in the classroom, this model will guide us into the identification of teachers' social representations on diversity regarding their own sociocultural and socioeconomic background and the one of their students as well as the social construction of the knowledge as specially organized for teaching/learning purpose.

According to our responsibility to communicate with the community, we hope that such a reflection can contribute through the elaboration of this theoretical framework to provide a means of empowerment linked to social equity in order to prepare teachers to become change agents because teachers have wonderful stories to tell (MacBeath, 1999).

References

Abdallah-Pretceille, M.(1988). Quelques points d'appui pour une formation des enseignants dans une perspective interculturelle. In F. Ouellet (dir.) *Pluralisme et école.* 495-509. Québec: IQRC.

Abric, J. C. (1994). Les représentations sociales : aspects théoriques. In J. C. Abric (dir.), *Pratiques sociales et représentations*. (pp. 11-35). Paris: Presses universitaires de France.

Akkari, A. (2000). Au-delà de l'ethnocentrisme en sciences de l'éducation. In P. R. Dasen & C. Perregaux (dir.). (pp. 31-48). *Pourquoi des approches interculturelles en sciences de l'éducation?* Bruxelles: De Boeck Université. Raisons éducatives no. 3 – 2000/1-2.

Arcand, B. & Vincent, S. (1981). *L'image de l'Amérindien dans les manuels scolaires du Québec*. Lasalle: Hurtubise.

Armaline W. D. (1995). Reflecting on Cultural Diversity through Early Field Experiences : Pitfalls, Hesitations, and Promise. In Martin, R. J. (eds) *Practicing What We Teach : Confronting Diversity in Teacher Education*. (pp. 163-180). State University of New York Press.

Atweh, B., Forgasz, H. & Nebres, B. (2001). *Sociocultural Research on Mathematics Education: An International Perspective*. Mahwah, N.J.: Erlbaum Associates, 446 p.

Banks, J. A. (1999). *Introduction to multicultural education*. 2nd ed. Boston, London, Toronto, Sydney, Tokyo, Singapore: Allyn and Bacon.

Bednarz, N. & Giroux, J. (in press). Analyse des interactions enseignant-élèves en termes de contrat didactique: à propos de l'introduction des fractions, In C. Tièche & R. Floris (éds.) *Premières journées de didactique des mathématiques de Montréal; la théorie des situations didactiques: bilan et perspectives*. Genève: Interactions didactiques.

Belkhir, J., Yarnevich, J., Shirley, L., & Charlemaine, C. (1995). Mathematics for all children: A multicultural race, gender & class analysis. *Race, Gender & Class, 3* (1). 125-160.

Bennett, C. I. (2001). Genres of Research in Multicultural Education. *Review of Educational Research, 71* (2), pp. 171-217.

Benton-Short, L., Price, M. D. & Friedman, S. (2005). Globalization from Below: The Ranking of Global Immigrant Cities. *International Journal of Urban and Regional Research, 29* (4), December 2005, pp. 945-959.

Berthelot, J. (1990). *Apprendre à vivre ensemble: Immigration, Société et éducation*. Québec: CEQ, Éditions Saint-Martin.

Boutin, G. (1997). *L'entretien de recherche qualitatif*. Québec: Presses de l'Université Laval.

Camilleri, C. & Cohen-Emerique, M. (1989). *Chocs des Cultures: concepts et enjeux pratiques de l'interculturel*. Paris: L'Harmattan.

Carignan, N., Sanders, S. & Pourdavood, R. G. (2005). Racism and Ethnocentrism: Social Representations of Preservice Teachers in the Context of Multi/Intercultural Education, *International Journal of Qualitative Methods 4*(3), Article 1. Retrieved [October 17, 2005] from http://www.ualberta.ca/~ijqm/backissues/4_3/html/carignan_htm.

Crespo, M., Carignan, N. & Kandarakis, H. (1997). *Étude d'impact de la mesure « enseignant-ressource en milieu défavorisé. Rapport de recherche*. Montréal: Conseil scolaire de l'île de Montréal.

D'Ambrosio, U. (1990). The history of mathematics and ethnomathematics. *Impact of Science on Society. 40* (4), 69-78.

Denzin, N. (1984). *The research act*. Englewood Cliffs, NJ: Prentice Hall.

Deslauriers, J. P. (1991). *Recherche qualitative, guide pratique*. McGraw-Hill, Eds., Thema,

Doise, W. (1990). Les représentations sociales, In *Traité de psychologie cognitive, 3*, (pp. 111-174), Dunod.

Dubet, F. (1994). *Sociologie de l'expérience*, Paris, Seuil, Collection "La couleur des idées".

Frankenstein, M. (1990). Incorporating race, gender, and class issues into a critical mathematical literacy curriculum. *Journal of Negro Education. 59*(3), 336-347.

Geoffrion, P. (2003). Le groupe de discussion. In B. Gauthier (ed.). *Recherche sociale: De la problématique à la collecte des données*. (pp. 333-355). Québec: Presses de l'Université du Québec.

Gigling, M. (2001). La structuration des représentations socioprofessionnelles de futurs enseignants du secondaire à travers différentes conceptions de l'enseignement. In M. Lebrun (ed.). *Les représentations sociales: Des méthodes de recherche aux problèmes de société*. Québec: Les Éditions Logiques.

Guba, E. G. & Lincoln, Y. S. (1994). Competing Paradigms in Qualitative Research. In N. K. Denzin & Y. S. Lincoln (Eds.). (pp. 105-117). *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.

Guba, E. G. & Lincoln, Y. S. (1989). *Fourth generation evaluation*. Newbury Park, CA: Sage Publications.

Hatch, A. & Wisniewski, R. ed. (1995). *Life history and narrative*. Falmer Press: London.

Hatala, R. L. (2003). *Understanding the relationship between undergraduate college of education professors' beliefs about student learning and teaching and their classroom practices*. Dissertation Abstracts. Cleveland: Cleveland State University

Hufferd-Ackles, K., Fuson, K. C. & Sherin, M. G. (2004). Describing levels and components of a math-talk learning community. *Journal for Research in Mathematics Education, 35*, 81-116.

Jodelet, D. (1991). *Les représentations sociales*, Presses Universitaires de France: Paris.

LaL, S. (2004). 1930's multiculturalism: Rachel Davis DuBois and the Bureau for Intercultural Education. *Radical teacher: a socialist, feminist and anti-racist journal of the theory and practice of teaching.* Vol. 69, pp. 18-22.

Laperrière, A. (2003). L'observation directe. In B. Gauthier (éd.), *Recherche sociale: De la problématique à la collecte des données*. (pp. 269-289). Québec: Presses de l'Université du Québec.

Lebrun, M. (éd.) (2001). *Les représentations sociales : des méthodes de recherche aux problèmes de société,* Éditions Logiques.

L'Écuyer, R. (1988). L'analyse de contenu : notion et étapes, In J. P. Deslauriers, *Les méthodes de la recherche qualitative,* (pp. 9-65), PUQ.

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hill, CA: SAGE Publications.

Martin Sanchez, M.-O. (2000). *Concept de représentation sociale*. Retrieved August 20, 2004 on the World Web Site: .

MacBeath, J. (1999). *Schools must speak for themselves: The case for school self-evaluation*. London and New York: Routledge

McAndrew, M. (2001). *Immigration et diversité à l'école: le débat québécois dans une perspective comparée.* Montréal: Les Presses de l'Université de Montréal.

McAndrew, M. (1990). L'éducation et la diversité socioculturelle: un champ de recherche et d'intervention en redéfinition? In M.-A. Hilly & M.-L. Lefebvre (dir.) *Identité collective et altérité: diversité des espaces / spécificité des pratiques*. (pp. 285-304). Paris: L'Harmattan.

Moodley, K. A. (1988). L'éducation multiculturelle au Canada: espoir ou réalité. In F. Ouellet (dir.) *Pluralisme et école.* (pp. 187-222). Québec: IQRC.

Morse, J. M. (1994). Designing Funded Qualitative Research. In N. K. Denzin & Y. S. Lincoln (Eds.). (pp. 220-235). *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.

Moscovici, S. (Éd.) & Abric, J. C. (1984). *La psychologie sociale.* Paris: Presses universitaires de France.

Moses, R. P. & Cobb, C. E. Jr. (1999). *Radical Equations: Math Literacy and Civil Rights*. Boston: Beacon Press.

Ouellet, F. (1991) *L'Éducation interculturelle: Essai sur le contenu de la formation des maîtres*. Paris: L'Harmattan.

Pagé, M. (1988). L'éducation interculturelle au Québec: bilan critique. In F. Ouellet (dir.) *Pluralisme et école.* (pp. 271-300). Québec: IQRC.

Pollock, M. (2001). How the question we ask most about race in education is the very question we most suppress, *Educational Researcher, 30* (9), pp. 2-12.

Preiswerk, R. & Perrot, D. (1975). *Ethnocentrisme et histoire : l'Afrique, l'Amérique indienne, et l'Asie dans les manuels occidentaux*. Paris: Anthropos.

Rossatto, C. F. (2005). Engaging *Paulo Freire's Pedagogy of Possibility. From Blind to Transformative Optimism*. Rowman & Littlefield Publishers, Inc.

Rouquette, M.-L. (2000). Représentations et pratiques sociales: une analyse théorique. In C. Garnier et M.-L. Rouquette (eds.). *Représentations sociales et education*. pp. 133-142.

Sabourin, P. (2003). L'analyse de contenu. In B. Gauthier (ed.), *Recherche sociale: De la problématique à la collecte des données*. (pp. 357-384). Québec: Presses de l'Université du Québec.

Sanders, M. & Carignan, N. (2003). Self- and Sociocultural Representations of Future Teachers, Teaching and Learning. *The Journal of Natural Inquiry & Reflective Practice, Spring 2003*, No.2, pp. 86-100.

Savoie-Zajc, L. (2003). L'entrevue semi-dirigée. In B. Gauthier (ed.), *Recherche sociale: De la problématique à la collecte des données*. (pp. 293-313). Québec: Presses de l'Université du Québec.

Schön, D. A. (1990, 1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Sleeter, C. E. (1997). Mathematics, Multicultural Education, and Professional Development. *Journal for Research in Mathematics Education, 28*(6), pp. 680-696.

Van der Maren, J.-M. (1995). *Méthodes de recherche pour l'éducation*. Montréal: Presses de l'Université de Montréal.

Vaughn, S., Shumm, J. S. & Sinagub, J. (1996). *Focus Group Interviews in Education and Psychology*, Newburg Park, CA: Sage Publications.

Wlodarsky, R.L. (2005). The professoriate: Transforming teaching practices through critical reflection and dialogue. Teaching and Learning: *The Journal of Natural Inquiry and Reflective Practice, 19* (3), pp. 156-172.

Zaslavsky, C. (1987). *Multicultural mathematics*. Portland, ME: J. Weston Walch.