

"I LOVE MAPS...BUT IS THAT A ROAD MAP OR A WEATHER MAP?" THE KNOWLEDGE OF MAPS AND ATTITUDES TOWARDS MAPPING IN QUÉBEC SCHOOLS (KINDERGARTEN, GRADES 1-11)

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Introduction

Today, in many countries, there is an increasing awareness of the need to examine aspects of graphic literacy at the elementary and high school levels. However, prior to making any informed decisions on how 'graphicacy', and specifically 'map literacy' can be improved for these students, we need to have a better insight of students' knowledge of, and attitudes towards maps. This paper presents some of my preliminary findings from just such an exploratory map study that was undertaken last year with over 600 Québec students between the ages of five and 17 years of age.

To put the exploratory study in context, the paper gives a brief summary of the structure and contents of Québec's educational programmes pertinent to mapping. This will be followed by an overview of the study's methodology and the responses to several of the survey's questions. In the conclusion of the paper there is a discussion of some of the possible implications of the findings of this work for cartographers and educators.

Mapping in the Québec school curriculum

Within Canada, education is seen as the responsibility of each province or territory. In Québec, the elementary students' exposure (Grades 1-6, this is between 6 to 11 years of age) to maps is primarily associated with the domain of social studies. This is perceived as both an opportunity and a means of developing the skills and concepts students require for a basic understanding of the world in which they live. At the high school level (Grades 7-12, that is between 12 to 17 years of age), mapping activities are primarily associated with specific geography modules. Québec's Ministry of Education (M.E.Q.) has produced many documents related to the definitions of the social studies and geographical domains, their learning objectives and curriculum guides (Québec, Ministère l'Éducation (M.E.Q.), 1993, 1990, 1985).

Québec's elementary Social Studies Programme, developed by the Ministry of Education, is divided into two cycles (M. E.Q, 1983). In the first cycle, Grades 1 to 3, maps are viewed as materials, the technical use of which will assist in developing the students' awareness of the concepts of time and space, as well as their awareness of society's cultural and economic realities. In the second elementary cycle, Grades 4 to 6, students study the general geography and history of their home region, Québec and Canada. Table 1, summarizes the technical skills involving maps associated with the elementary levels.

REPRESENTATION OF SPACE	SPATIAL LOCATION	DISTANCE
<i>Kindergarten (not compulsory) (5-6 years)</i>	-----	-----
<i>Cycle 1 (Grades 1-3) (6-9 years)</i> identify features on photographs and plans	identify cardinal directions	compare map distances (e. g., string on a map)

<p><i>Cycle 1 (Grades 4-6) (9-12 years)</i></p> <p>recognize shape and location on a globe and outline</p> <p>read a map legend</p>	<p>use of intermediate cardinal direction on a map</p> <p>identify features, e.g., North Pole on a globe and world map</p>	<p>read and use a graphic scale</p>
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Table 1: Objectives Relating to Technical Skills in the Elementary Curriculum. (Source: Québec, Ministère l'Éducation. (1983) p. 55-56)

At the high school level, compulsory geography modules are taught in two grade levels: Grade 7 (12 -13 years) and Grade 9 (14 -15 years). In Grade 7 a wide range of topics, at a world scale, are taught using modules (M.E.Q, 1993, 1985). Some of these modules, such as location and geographic co-ordinates, expose students to concepts related to maps and mapping. Other modules are specifically designed so that students learn about and work with different kinds of maps at varying scales, such as topographic, world, atlas, road and city maps. In Grade 9, students engage in an in depth study of the physical and human geography of Québec and Canada.

Methodology of the exploratory study

On first examination the 'mapping components' in Québec's curriculum guides appear impressive. But what happens in reality? Many of the students in my first year university introductory cartography course have difficulty working with basic mapping concepts such as scale. The majority also appear to be unfamiliar with topographic maps.

Recently, I conducted a study which was designed to provide insight into the knowledge of maps and attitudes towards them held by current Québec students. In the winter of 1995, over six hundred students between the ages of 5 and 17, from four urban Montreal schools, participated in a survey. All the children were presented with nearly identical questions and material. For the younger children, Kindergarten through Grade 3, the survey was presented orally, generally by one of their teachers. For Grades 4 through 6 the survey was presented orally and the children provided written responses. The high school students (Grades 7-11) completed a written survey. I shall examine aspects of the students responses to several of the questions posed. These questions were:

- "What is a map?"
- "How do you feel about maps?"
- "What do you hate most about maps?"
- "What do you love most about maps?" and
- "What information does this map show?" (for several map samples).

"What is a map?"

"What is a map?" was the first question in the survey, the written responses to which are summarized in Table 2. The majority of responses referred to the function a map serves. Answers involving location, such as "a map shows the world," were given by 48 percent of the students. Responses that defined maps solely for the purpose of "navigation," or for the combination of location and navigation were also popular. Only a relatively small number of students identified a map as some form of representation. The elementary students generally gave a single response. For the students in Kindergarten through Grade 3, maps are seen primarily as something which, "shows you where to go" or "if you get lost you look at it."

CATEGORY	GRADE 4-11 (NUMBER OF STUDENTS)	PERCENT
location	242	48
navigation	92	18
location and navigation	52	10
representation	63	12
geographic information	21	4
tool	8	2

graphic contents	8	2
miscellaneous	21	4
<i>Total number of students: 507</i>		

*Table 2: Responses to "What is a map?"
(Source: Anderson 1995 Data Survey)*

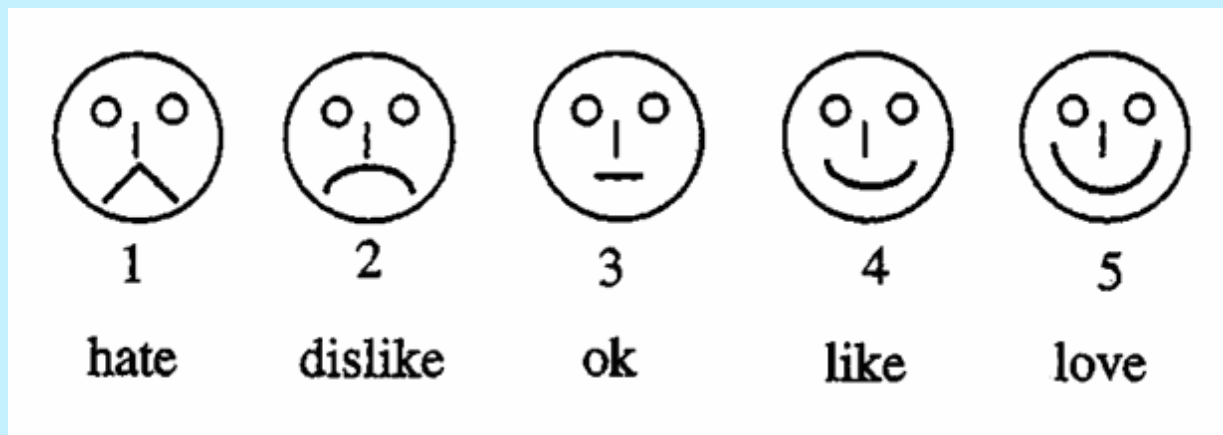
Responses in which a map was identified as something that primarily shows a place were characteristic of students in Grades 4 through 6. The 'places' mentioned by the Grade 4 children were generally large areas such as the world. By Grade 6, however, the responses mentioned most frequently were, "country," "region" and "new places." The location of "places" also dominated high school students' responses. Descriptions of maps as showing the location of a variety of geographic information such as climate and soils was primarily associated with Grades 7, 9 and 10.

Some of the other written responses were characteristic of all grades while others were confined to certain grades. The role of a map for both location and navigation was given by students from Grades 4 to 11. However, a description of a map as a representation, picture, diagram or view from above, only emerged in the responses of the high school students. The characterization of a map as a tool was only expressed in Grades 10 and 11. There was also a small number of students, between Grades 5 and 9, who identified a map solely by its graphic components, for example, a map is "lines," "colour and words."

"How do you feel about maps?"

The question, "How do you feel about maps?" was approached by the use of "the five faces" and a set of instructions (Figure 1). All students were asked the same question and, with the exception of the Kindergarten children, responses were recorded as a pencil and paper exercise with each students placing an X on the face that best showed how they felt about maps. The Kindergarten students viewed the faces on a transparency and indicated their choice by standing when their teacher pointed to a particular face.

How do you feel about maps? Look carefully at each of these five faces.



If you love maps you would choose the very happy face (face 5).

If you hate maps you would choose the very sad face (face 1).

If you like maps you would choose face 4.

If you dislike maps you would choose face 2.

If you think maps were OK you would choose face 3.

Remember you can only choose one face.

Put an X on the face that best shows how you feel about maps.

(The original diameter of each 'face' was 2.5 cm.)

Figure 1: The Five Faces.

The results by grade level are summarized in Table 3. In the early grades, prior to much formal map instruction (Kindergarten through Grade 3), the majority of young children appear to love maps. Children in these levels are aware of maps, view them, and make them, but do not really use maps. Students' love of maps starts to change in

Grade 3, and by Grade 5 the majority of students rank maps as only "ok." It is also interesting to observe that in the grades where there is some concentration of work involving maps, Grades 4, 7 and 9, a high proportion of the students identified that they liked maps. However, in the subsequent grades, particularly Grade 8, a marked decline in this percentage is evident.

GRADE (AGE) [NUMBER OF STUDENTS]*			RESPONSES (PERCENT)					
			1 hate	2	3 o.k.	4	5 love	missing
K	(5-6 years)	[27]	7	0	15	0	78	0
Cycle 1								
1	(6-7 years)	[41]	5	0	29	10	46	10
2	(7-8 years)	[40]	8	0	19	0	73	0
3	(8-9 years)	[44]	2	2	16	41	39	0
Cycle 2								
4	(9-10 years)	[71]	6	0	15.5	63	15.5	0
5	(10-11 years)	[51]	2	0	53	37	8	0
6	(11-12 years)	[46]	13	7	56	17	7	0
High School								
7	(12-13 years)	[85]	6	10	49	28	6	1
8	(13-14 years)	[52]	25	6	49	10	8	2
9	(14-15 years)	[72]	1	8	53	31	4	3
10	(15-16 years)	[71]	7	8.5	46	24	8.5	6
11	(16-17 years)	[59]	2	8	57	27	6	0
* Total number of students = 659								

Table 3: Responses to "How Students Feel About Maps"
(Source: Anderson 1995 Data Survey)

"What do you hate most about maps?"

The question posed after identifying how the children felt about maps was, "What do you hate most about maps?" The categorized students' responses appear in Table 4. A large number of students choose either not to respond to the question or wrote that there was nothing that they hated about maps. Forty percent of the responses given were classified as general negative comments. More than half of these mentioned that maps were hard to understand, confusing, or complicated. The other two most popular general comments were that maps were "boring" and "difficult to read."

CATEGORY	GRADE 4-11 (NUMBER OF STUDENTS)	PERCENT
general comments	202	40
specific activities	68	13
graphic contents	84	17

nothing	39	8
information content	35	7
miscellaneous	19	3
scale	14	3
unable to classify	11	2
missing data	35	7
<i>Total number of students: 507</i>		

*Table 4: Responses to "What do you hate about maps?"
(Source: Anderson 1995 Data Survey)*

In the specific activities category, students expressed a dislike for carrying out several map tasks which ranged from finding particular locations to using the grid, scale and legend. The student's dislike of maps was also directed towards the contents of maps. Whereas some students found that there was too much information on maps, others stated that there was not enough! Other remarks identified the contents of maps as not accurate, unrealistic and frequently out of date. The graphic portrayal of the information was also a source of dislike. In this category, the fact that the "names were too small" was singled out by 52 of the 84 respondents. "Too many lines" was the other major comment in this category. The miscellaneous comments included reference to the problem of folding maps and receiving paper cuts.

"What do you love most about maps?"

A wide variety of responses were given by the students to the question, "What do you love most about maps?" (Table 5). The category of general comments included descriptions of maps as "fun," "interesting to look at" and "easy to use." The fact that maps could be used for specific activities was the dominant reason given for students' love for maps. One hundred and seven of the 164 responses gave navigation as the reason for their love of maps while 44 of the remainder singled out the use of maps to locate something. Other specific tasks mentioned ranged from using the mileage distance charts on maps to looking for the names of water features. The comments related to the map contents generally referred to the area of coverage and the amount of detail portrayed. Nine percent of the responses attributed their love for maps to the graphic nature of a map with the employment of colour as the major reason given. There were also numerous students who chose not to comment or who wrote that there was nothing that they loved about maps. Included in the miscellaneous category were negative comments such as, "putting them away" and "that someone else reads them."

CATEGORY	GRADE 4-11 (NUMBER OF STUDENTS)	PERCENT
location/navigation tasks	164	32
general comments	151	30
graphic contents	45	9
information content	30	6
nothing	37	7
specific activities	22	4
miscellaneous	13	3
unable to classify	14	3
missing data	31	6
<i>Total number of students: 507</i>		

*Table 5: Responses to "What do you love about maps?"
(Source: Anderson 1995 Data Survey)*

What information is shown on this map?

To identify the map information that was most important to students, colour reproductions of 14 maps, as either slides or overhead transparencies, were shown to all the students. For the elementary students, the emphasis was placed on

asking what information was shown on the map. The additional question of identifying what kind of map they were viewing was posed to the high school students. Although the same number and kinds of maps were not used for each grade there was some overlap. Three of the maps viewed by all the students are considered in this paper. These are the official provincial Quebec Road Map (Figure 2); the Washington D.C. metro map (Figure 3); and a newspaper weather map (Figure 4). The student's responses for these maps (Table 6), were coded as correct, incorrect or missing. The striking feature in Table 6 is the fact that whereas most students from Grade 5 upwards gave correct responses for the metro and weather map, students in Grade 10 and 11 still had difficulty recognizing the road map.

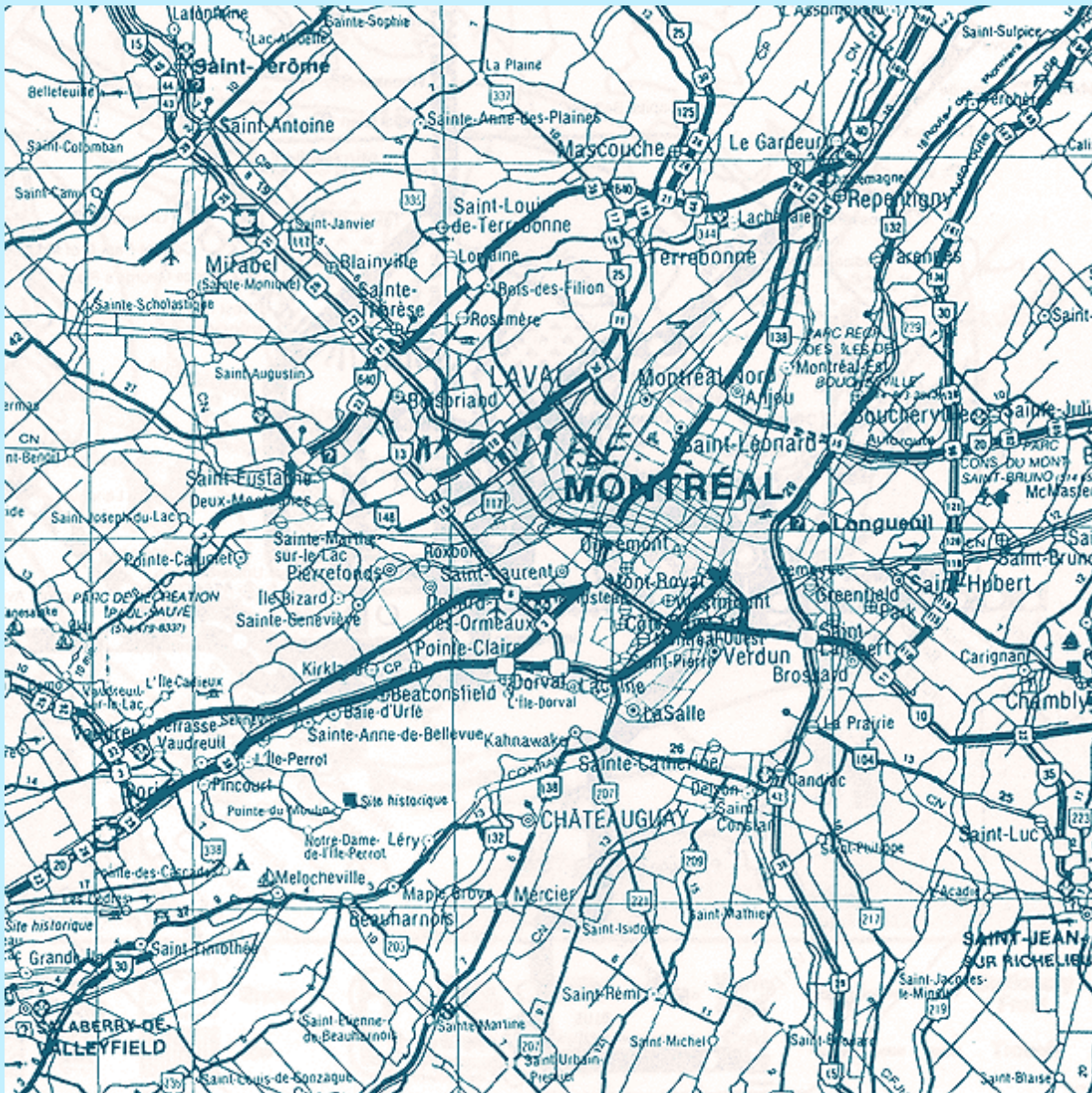


Figure 2: Québec Road Map (fragment). Original in colour. The dimensions of the original section shown to the students were 18.5cm by 23.5cm. (Source: Québec, Ministère des Transports).

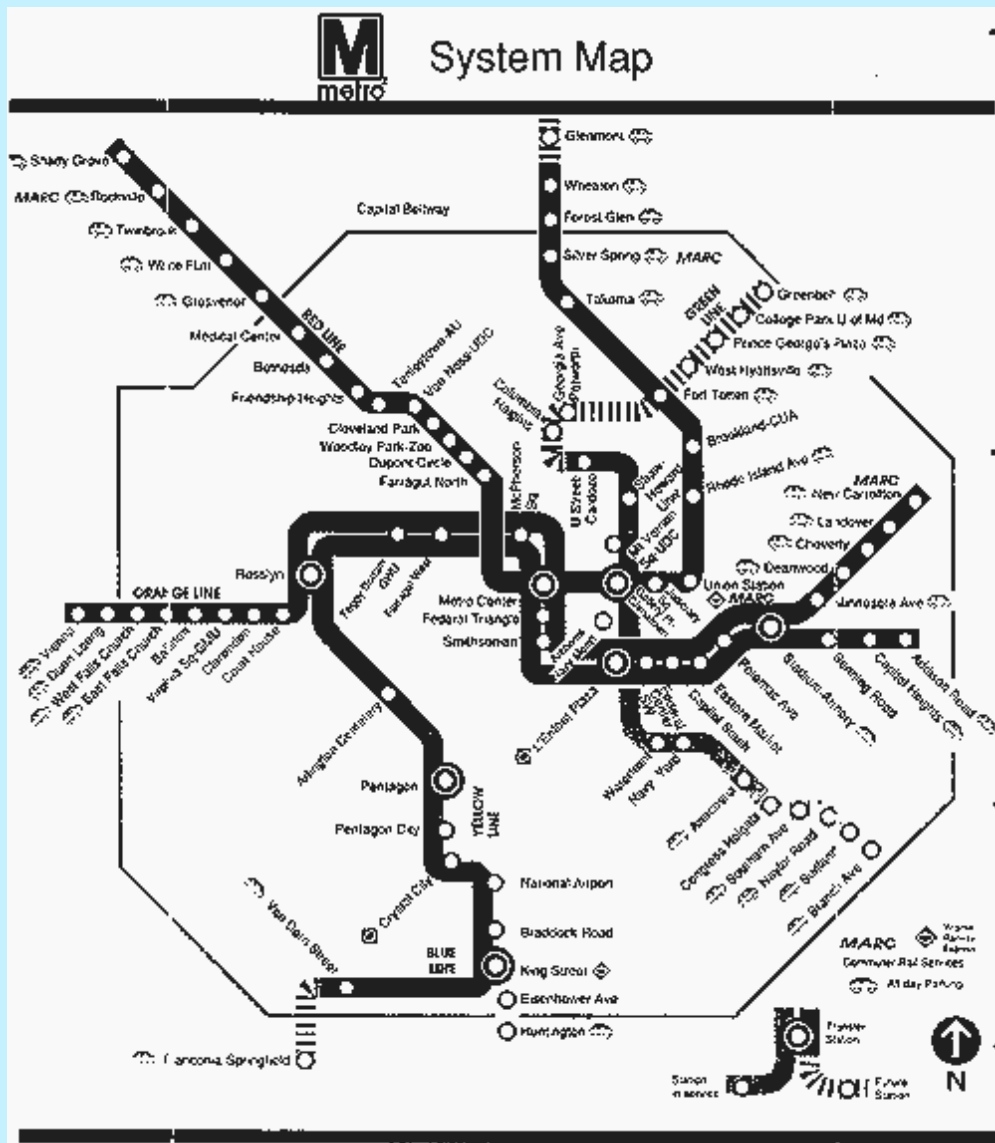


Figure 3: Metrorail Station Map. Original in colour. The original dimensions were 13.3 cm by 15.0 cm. (Source: Metrorail Station Map, 1991. Metro System Pocket Guide. Washington DC: Metropolitan Area Transit Authority).

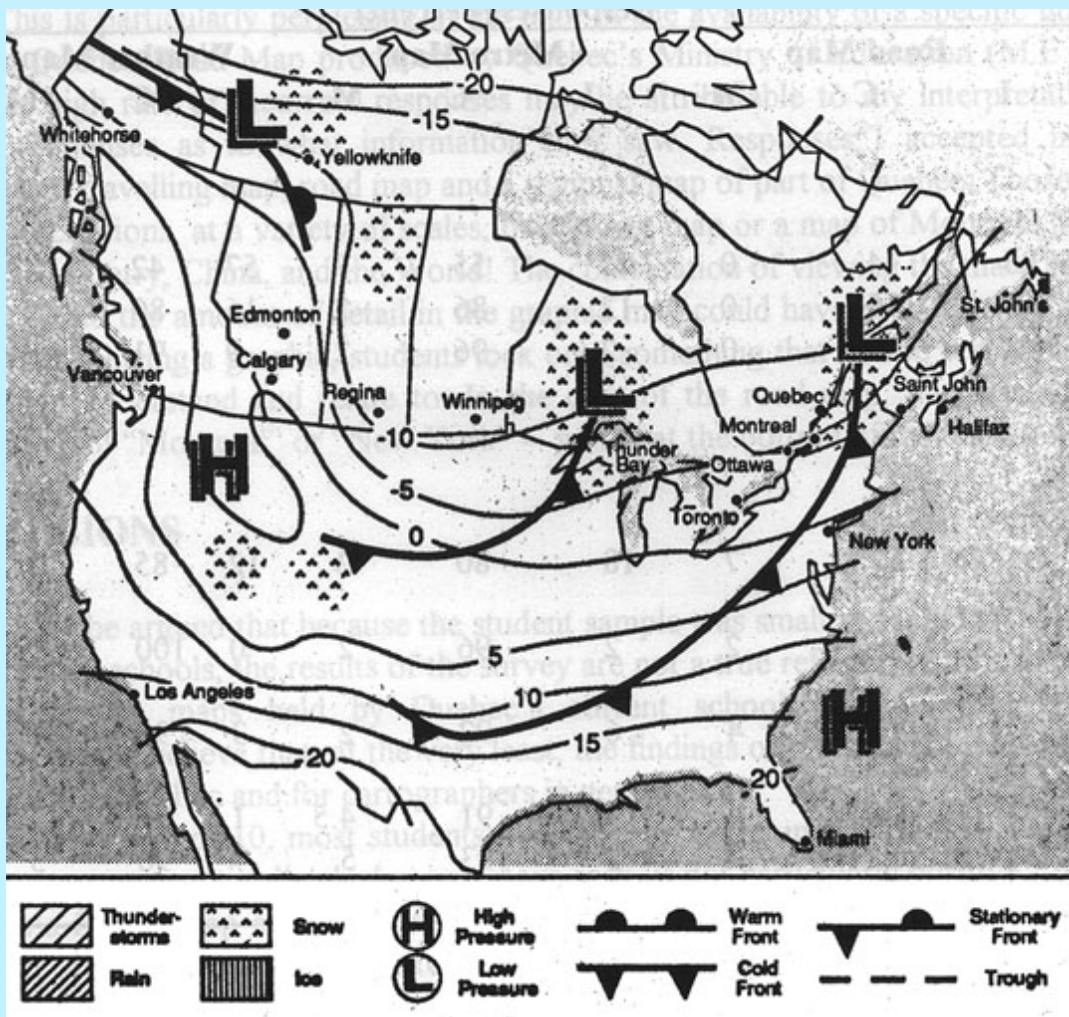


Figure 4: Weather Map. Original in colour. The original dimensions of 13.0 cm by 11.3 cm (Source: Gazette, 1989 "Tomorrow's Weather Systems." The Gazette. Montreal, Canada. 11 February, Section C-8).

GRADE	RESPONSES (PERCENT)								
	Road Map			Metro Map			Weather Map		
	I	C	M	I	C	M	I	C	M
Cycle 2									
4 [71]*	86	14	0	42	55	3	57	42	1
5 [51]	65	35	0	12	86	2	16	80	4
6 [46]	48	52	0	2	96	2	9	91	0
High School									
7+ [85]	33	60	7	18	80	2	12	85	3
8 [52]	60	38	2	2	96	2	0	100	0
9+ [72]	20	76	4	6	92	2	3	95	2
10 [71]	12	84	4	4.5	91	4.5	1.5	94	4.5
11 [59]	20	68	12	2	93	5	7	90	3

* numbers in square brackets indicate number of students
 I=Incorrect
 C=Correct
 M=Missing
 +=geography modules taught

*Table 6: Responses to the Identification of the Official Québec Provincial Road Map, Metro Map, and Weather Map
(Source: Anderson 1995 Data Survey)*

Although many of the younger elementary students had problems with each of these maps, they were recognized by some students. One 6 year old described the weather map as "the TV map" on "the news channel", while one 7 year old described the metro map as "it's a map for trains." Although young children have little formal education in maps, it would be wrong to assume that they are not conscious of maps or parental use of maps.

The incorrect responses to both the metro and weather maps were generally attributed to responses that described the colour of a particular symbol such as "a yellow line" on the metro map, or a type label such as "Capital Beltway" on the metro map. (Unfortunately the yellow line has not reproduced well in Figure 3, it runs from Vernon in the map centre to Huntington in the south.) One student initially described the weather map as a "two H and two L map" while another said that it was "Winnipeg."

Given students' strong identification of maps with navigation, the generally poor responses, at all grade levels, associated with the Provincial Road Map, are difficult to explain. This is particularly perplexing in the light of the availability of a specific guide to the use of the Québec Road Map produced by Québec's Ministry of Education (M.E.Q, 1987). Part of the high rate of incorrect responses may be attributable to my interpretation of the students' responses as to what information they saw. Responses I accepted included, a highway map, traveling map, road map and a regional map of part of Québec. Those I rejected included descriptions, at a variety of scales, from a city map or a map of Montreal to a map of Québec, the country, China, and the World! The combination of viewing the material as a slide or overhead and the amount of detail in the graphic may could have been a factor in the poor results. When viewing a graphic, students lock onto something that can be seen, is legible, and that they can understand and relate to. In the case of the road map, this was the city and regional name of "Montreal" or "New York" - words at the bottom of the map in the U.S.A.

Conclusions

It may be argued that because the student sample was small and conducted in only four Montreal urban schools, the results of the survey are not a true reflection of the knowledge of, and attitudes to, maps held by Québec's current school population. This argument notwithstanding, I believe that, at the very least, the findings of the study do have implications for educators in Québec and for cartographers in general.

If, at the age of 10, most students have already made up their minds about how they feel about maps - an attitude which, as we have seen, is not particularly positive - why is most of Québec's formal map education introduced at the high school level? Young students are enthusiastic about maps. Should directed and exploratory aspects of mapping, including relevant large scale maps and navigation and location tasks, form some major integrative component of students' early social studies instruction? This question needs to be addressed since its implementation would require important commitments for the provision of teacher training and the development of suitable teaching tasks and associated materials.

Many students stated that their dislike for maps was related to the fact that they found maps confusing and hard to understand. Are some of the difficulties students encountering with maps the result of learned helplessness? Can part of this be attributed to the cartographic design of the product? Many students commented that the names were too small and difficult to read. Do the maps students that students initially encounter provide negative and unacceptable experiences? If initial encounters with maps are too frustrating, there is little insensitive to seek them out as tools to resolve spatial problems. I would like to suggest that the preliminary findings given in this paper raise more questions than they answer but that these are some of the very questions that must be addressed if the current level of map literacy is to be improved in school children.

The papers of the Map Summit Gifu '96 represent an impressive and exciting cross-section of the topics being researched related to cognition, and mapping as they relate to children and education. Much challenging work remains to be done before there will be any major changes to current educational and cartographic practices. However, I believe an encouraging start has been made and I am confident that progress will be made in the area of mapping for and by children.

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