# Can computational technology improve students' historical thinking: Experience from the Virtual Historian©

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Dr. Stéphane Levesque
Associate Professor
Faculty of Education
University of Ottawa
Ottawa ON
stephane.levesque@uOttawa.ca

## Abstract:

This study investigated the role and impact of a digital history program (the *Virtual Historian*©) on students' historical thinking and reasoning about a controversial episode in Canadian history. The purpose was to examine whether the use of the *Virtual Historian*©, a web-based inquiry program to teach Canadian history, improves the learning of a key episode in the school curriculum (French-English relations and the October Crisis, 1970). Using a quasi-experimental design, two Ontario grade 10 classes were assigned to a treatment group (*Virtual Historian*©) and comparison group (classroom lessons) on the topic. Findings indicate that using the *Virtual Historian*© can increase more significantly students' understanding of the subject-matter and their ability to think and write historically than classroom inquiry-based lessons.

## Résumé:

Cet article présente les résultats d'une étude quasi-expérimentale menée auprès de deux groupes d'élèves ontariens de la 10e année inscrit au cours d'histoire du Canada. L'étude avait pour but d'examiner le rôle et l'impact des technologies de l'information et des communications (TIC), et plus particulièrement d'un nouveau didacticiel en histoire canadienne, *l'historien virtuel*©, sur l'apprentissage d'un épisode marquant de l'histoire scolaire (la Crise d'octobre, 1970). Les résultats de l'étude indiquent que les élèves du groupe expérimental (*l'historien virtuel*©) ont développé une meilleure compréhension de l'histoire et de la Crise d'octobre que ceux du groupe de comparaison (enseignement en classe).

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Introduction

History educators have long argued for more authentic forms of history teaching and learning.

Growing evidence now suggests that historical thinking – that is, the ability to study and think

critically about the past – is best cultivated when students are engaged actively in inquiry-based

learning. Instead of simply accepting or rejecting *en bloc* authoritative interpretations of the past,

students who participate actively in doing history are more likely to ask meaningful questions

about the significant past they study and, perhaps more importantly, engage in the process of

investigating, reading, questioning, and developing evidence-based interpretations that are

opened up to criticism and revision. In sum, it can be said from research that inquiry-based

history learning can improve students' learning of the subject (Barton & Levstik, 2001; Seixas,

2002; VanSledright, 2002).

The recent development of hypermedia instructional technologies have been regarded by

technological aficionados as the perfect medium to achieve the goals of inquiry-based learning

(see Larson, 2005; Lee, 2002; Sandwell, 2004). Because of their structure and power, these

programs have been the subject of many lively school discussions, professional development

sessions, articles, and magazine coverage. Yet, very few empirical studies have been conducted

on the use and impact of these instructional technologies on students' learning (Milson &

Downey, 2001; Milson, 2002; Lipscomb, 2002; Saye and Brush, 2004, 2006; Spaeth &

Cameron, 2000). Much of what is available comes from limited, inconclusive, or unrealistic

studies having little resemblance with current teaching practice, particularly in the Canadian

context which carries its own distinctive content and curriculum.

The goal of this exploratory study was to investigate the role and impact of a digital history program (the Virtual Historian[©]) on students' historical thinking and reasoning about complex events in Canadian history. The purpose was to examine whether the use of the Virtual Historian[©] (VH) improves the learning of a key episode in Canadian school history curriculum (Terrorism and the October Crisis, 1970).

Theoretical framework and historical thinking challenges

Theoretical framework

The general theoretical framework of this study is based on a constructivist epistemology, which gives emphasis on students' active construction of knowledge (Gardner 1991; Gardner and Boix-Mansilla, 1994). Meaningful and enduring understanding, from this perspective, is an active and continuous process of knowledge acquisition and (re)construction in light of students' prior knowledge, understanding, and engagement with the subject-matter. In history education, several studies (Shemilt, 1980; Seixas, 2002; Wineburg, 2001) have documented the futility of teaching historical knowledge with traditional stories about the past. Instead, they have pointed to the necessity of engaging students actively in the reading, sourcing, researching, and doing of historical investigation.

Yet, as Sam Wineburg (2001) puts it so eloquently, historical thinking is far from a "natural act." Because students do not intuitively learn how to think critically about the past (or the way historians do), teachers must have (1) a deep understanding of their discipline, and (2) successful instructional strategies and pertinent pedagogies that support such active learning and thinking in the classroom. Small but growing evidence in social studies education suggests that the

development of a community of inquiry can help create more sophisticated thinking in the discipline (Bain, 2006; Friedman, 2006; Levstik & Barton, 2001; Seixas, 1993; VanSledright, 2002). Linda Levstik and Keith Barton (2001) indicate, for instance, that the history process of asking meaningful questions, finding evidence, and drawing conclusions is known as inquiry. "Children," they argue, "are naturally inquisitive learners who strive to make sense of their world" (p. 13). Teachers, from this perspective, "can capitalize on children's natural enthusiasm for learning by making their classrooms places where students explore important and meaningful questions" (ibid.). Such inquiry learning strategies in the domain, however, pose significant challenges to educators. For Peter Seixas (1993), the community of inquiry in the history classroom does not – and cannot – simply replicate the one of the historians. Given the fundamental differences in age, experience, and relation to knowledge and authorities, the classroom community of inquiry is rather a place where the "history teachers occupy a key position between two communities organized around history knowledge and learning" (p. 319). Students can only form a community of inquiry if they are progressively introduced to inquiries "under the skillful direction of a teacher" (Seixas, 1993, p. 320). Indeed, as studies in the field reveal, the development of expertise in history must be based on a sound pedagogy that "value[s] inquiry deeply to undertake the challenges of such demanding practice" (Saye and Brush, 2006a, p. 184). Unfortunately, despite various educational reforms and scholarly talks about engagement in historical challenges, few teachers actually engage their students in authentic inquiries about the past, too busy are they covering curriculum expectations for content standards and state evaluations (Barton and Levstik, 2003). Yet, students cannot have any understanding of history if they have no understanding of and exposure to how historical knowledge is constructed and disseminated.

The potential benefits of building a community of inquiry in the history classroom are many. First, it provides teachers with some experience and understanding of what it means to think critically about the past and how students can progress toward more sophisticated thinking. From this perspective, as Bruce VanSledright (2004) contends, historians can serve as a "benchmark in relationship to which we can understand what the less sophisticated historical thinkers do" (p. 230). Second, a community of inquiry creates a learning environment that is more conductive to students' own discovery – a key aspect of constructivist learning. Unlike the behaviourist model focused on the delivery of traditional lectures and students' participation in the form of "acquisition-response-evaluation," the community of inquiry puts students in charge of their own learning and engages them in authentic inquiries about the past. Finally, building a community of inquiry necessitates a different learning interaction with the subject-matter. Because students do not intuitively know how to think critically in history, they must count on the coaching support of teachers. On the one hand, teachers must model best practice by demonstrating to students what it is like to inquire, that is, to investigate the past using essential questions, to collect and analyze evidence, to draw conclusions and make judgements. On the other hand, coaching students implies another key element of inquiry-based learning: scaffolding. Because students need support in order to progress in their experience of the subject-matter, teachers must provide them with the structure they need to learn. By breaking down the investigation activity into smaller and more manageable components and by offering scaffolds, it becomes possible for students to engage progressively in meaningful inquires.

Equally challenging to a community of inquiry for the 21st century is the use of new technologies. I have argued elsewhere that rich technological open learning environments, such as digital history programs, can support inquiry-based learning because of the types of materials and opportunities they offer to users (Author, 2006). With the development of the internet and related online applications, there has been a push in the last decade to infuse technology into the curriculum. As Thomas Brush and John Saye argue in light of their own research with Problem-based inquiry activities, digital open learning environments (1) help create more realistic, vivid engagement with history (life-like inquiries) than what is currently available to students in class, and (2) draw on and stimulate students' development of expertise in history and new technologies.

While school subjects such as science, language arts, and geography have directly benefited from the affordances of hypermedia instructional technologies, history continues to lag behind (see Cohen and Rosenzweig, 2005). In Canadian education, in particular, there are few interactive programs geared toward history education beyond archival websites, virtual tours, and online textbooks[1]. Perhaps more problematic are the recent research findings suggesting that the lack of relevant technological training and the limited access to equipments and pedagogical technologies are key factors impeding the effective use of digital history in the classroom (Friedman, 2006). Valuing inquiry is, therefore, not a sufficient condition to guarantee engagement in history learning. Educators must have access to pertinent technological resources as well as adequate computer training and experience that support such an active pedagogy of doing history (Bain, 2006; Saye and Brush, 2006b).

The Virtual Historian and Inquiry-based learning challenges

The VH is a bilingual digital history program ([www.virtualhistorian.ca](www.virtualhistorian.ca)) designed to engage

students in various investigations of Canada's past in a reality-like environment (see Figure 1).

Unlike textbooks, learning guides, and even WebQuests, the VH provides users with non-linear,

authentic, and realistic inquiries ("missions") about key issues in Canadian history. All web-

based inquiries are framed around "topical questions," which call for critical analysis, dialectical

reasoning, and sophisticated understanding of central phenomena in the history curriculum

(Wiggins and McTighe, 2005, p. 113). To complete their school inquiries, students are provided

with online instructions on how to use the VH, a brief synopsis of the "mission" with a topical

question to answer, curriculum rubrics presenting all learning objectives addressed in the

mission, multiple and conflicting primary and secondary sources on the issue (including high

resolution digitized copies that can be manipulated online), embedded reading, sourcing, and

writing scaffolds to support thinking and active learning and writing, and a web-based notepad to

record and write answers (see Figure 2). Students have also access to an online glossary,

additional web resources (e.g., national archives, museums, and newspapers) as well as to an

integrated email program to communicate with their teacher or the program administrator.


By using digital history (the VH) in the Canadian classroom, this study aimed to uncover the still

unclear role and influence of such instructional technology on students' historical thinking – in

terms of knowledge acquisition, procedural understanding (use of evidence, perspective, and

moral judgement), and epistemological knowledge understanding (how historical knowledge is

constructed). Because of its great potential for teacher and students, the assumption of this study

is that digital history, as built in the VH program, can "*mediate* and *support* students' historical

thinking" (Bain, 2006, p. 109).

<u>Methodology</u>

Subject-matter:

To investigate these two questions, one "historical case" studied in the grade 10 Canadian and World Studies curriculum for Ontario was developed in collaboration with teachers: Terrorism and the October Crisis of 1970.[1] This topic of study is common to the grade 10 Canadian history curriculum and clearly identified in the learning objectives under the "development of French-English relations in Canada" (Ontario Ministry of Education, 2005, p. 46). One class undertook the activity using exclusively the VH program and another class learned about the subject-matter from classroom-based material and lessons. The case, framed around a "mission" to investigate, asked students to answer the following question at the end of their activity: In your opinion, was the Canadian government's decision to invoke the War Measures Act reasonable at the time of the October Crisis?

Participants:

The participants were all grade 10 students taking compulsory Canadian history (academic level) in a large Southwestern Ontario high school. The demographic information for the participating school indicates that 1143 students were enrolled for the year the study was conducted. Of this number, 273 were in grade 10. Results of the Ontario grade 10 literacy test for the school indicate that nearly 94 percent of participating first-time eligible students successfully completed the Ontario secondary school literacy test (compared to 84 percent for the province). No specific information was recorded on gender, ethnic origins, and first language. The VH group was made

up of one class of voluntary participants (n = 22) for whom the topic was presented and learned exclusively from the VH inquiry program for a duration of three 75-minute periods. A comparison group of one class with the same history teacher (n = 22) did not undertake the learning of the October Crisis with the VH, but instead learned about it from a classroom inquiry-based learning model. Lessons for the comparison group included a mix of lecture (1 period), small group activities (1 period), and independent research study (1 period). The material used for the comparison group included textbook passages from three Ontario approved history textbooks for grade 10, a Power Point presentation, teacher's personal notes, additional secondary sources on the topic selected by the teacher (two recent newspaper clippings and a video clip from CBC) and finally access to internet (but not the VH program). The textbook readings (six photocopies) and the additional sources (newspaper clippings and video clip) were used by students during a small group carousel activity. For each of the three stations of the carousel (textbooks, newspapers, video), students were asked to consult the material and record the most important points on a separate sheet of paper for their essay. During the independent study period, students were given the opportunity to revisit the sources presented in class, meet their teacher, and use the library and computers for additional sources (except the VH).

The two classes were not exposed to randomization as the school and classrooms were selected on their willingness to participate and typicality (i.e., represent particular characteristics such as mix of students' achievement, ability to read and write in English, exposure to web-based technology, teacher's interest in infusing technology in class). Both classes had the same number of students and overall average (70 percent) before the experiment. All students were Canadian citizens, English-speaking in the academic stream of the Canadian and World Studies program.

The selection of the VH group (which met on afternoon classes) was made according to the computer lab schedule for the week of the experiment.

Tasks and procedure:

The participating teacher was first introduced to inquiry-based learning and the VH program, and was asked to spend the same amount of teaching time on the topic, regardless of the groups. With the comparison group, the teacher carried out one 75-minute lesson on French-English relations, and more specifically on the October Crisis, with personal notes and a Power Point presentation. The second lesson was organized around a carrousel activity. The teacher's role was to control and supervise students' learning and note-taking. During the third history lesson, students were provided with the opportunity to meet with the teacher for their assignment, access sources used by the teacher during his lessons, and visit the library to consult and gather additional sources available on the topic, including the internet.

The VH group received a brief introduction to the VH from the teacher the day before the study, and then spent three additional 75-minute classes on the web-based historical investigation. The teacher's role was to assist students in their individual learning of the topic from the VH inquiry program in the computer lab. Each student was assigned a desktop computer equipped with high speed internet and personal headset. No formal classroom teaching on the topic took place with the group before the completion of the experiment. The principal researcher and research assistant conducted observations during these lessons to monitor the use of and progress in learning with the VH.

To assess students' historical learning, three instruments were developed. One pre-test identified students' prior knowledge and understanding of Canadian history and the October Crisis. This test was distributed before the start of the study (see appendix A). The same pre-instruction test questions were also used in a post- test, delivered the week after the study, to assess their progression in historical learning. Four additional post-test questions were also included concerning their awareness of what has been learned, that is, their metacognitive competence. Finally, as a performance assessment, both groups were asked at the beginning of the unit activity to research and write an argumentative essay on the October Crisis (see subject-matter). To complete their essay, students in both groups were provided with a worksheet developed by the teacher (based on the curriculum expectations) on how to write an argumentation

All assessment data used with the VH and comparison groups were analyzed and rated independently by two judges (principal investigator and research assistant). Focus was placed on historical literacy and critical thinking: historical knowledge acquisition, procedural knowledge understanding (use of evidence, perspective, moral judgement), and epistemological knowledge (understanding of the discipline). The coding for each question and concept followed loosely the British model of progression in historical thinking (see Shemilt, 1980; Lee & Ashby, 2000). Three stages of historical thinking were broadly identified: limited (or naïve), incomplete (subjective), and advanced (interpretative). At level 1 (limited), students understand history in naïve realistic terms. They believe that knowing history (or in this particular case, the October Crisis) is equivalent to knowing the historical "facts." The more facts one can master, the better he or she understands the subject-matter. At the second level (incomplete), students recognize the contested, multifaceted nature of history, but only in terms of "biases." Differences (e.g.,

being for or against the WMA) are simply the result of people's own personal opinions about the past. Sources are still not seen as evidence but as "facts" from the past. At the third level (advanced), students understand that knowledge of the past is constructed according to particular questions and historical evidence. Contextualization, perspective, and critical analysis of various sources, seen as evidence, can lead to different interpretations of the same events. Sources are not all equal; some are more significant and reliable than others. While these three levels are incomplete and do not judiciously reflect the full range of possibilities of looking at progression in historical thinking, they nonetheless provide a useful analytical way of mapping students' ideas regarding their learning of Canadian history (appendix B provides the rubric used for assessing students' argumentative essays).

Findings

Table 1 presents data on the VH and comparison groups concerning their understanding of the subject-matter, discipline, and metacognition. For both groups, students increased their comprehension of the October Crisis (specific dates, location, actors involved, law invoked, consequences, and significance) and understanding of history (how historians study the past, why different interpretations of the October Crisis). To assess the effect of the VH on students' learning, a multivariate analysis of variance (MANOVA test) was conducted, using pre-test scores as a covariate, instructional groups (VH, comparison) as the independent variable, and the post- test, metacognition, and essay as dependent variables.[2] MANOVA results reveal a large, statistically significant effect of the VH on the combined dependent variables (post-test, metacognition, essay), Pillai's Trace $= .452$, $F(3, 34), = 9.37$, $p < .001$, $\eta^2 = .45$ (see Table 2). Although the mean scores on the pre-test were different between the VH group (M = 4.12 / 20)

and the comparison group (M = 2.17 / 20), the multivariate test statistics indicate that the pre-test did not affect the combined dependent variable, Pillai's Trace = .152, $F$ (3, 34), = 2.03, $p$ = .128, $\eta^2$ = .15. Analysis of relationship between pre- and post-test scores also reveal a low coefficient of correlation between the two sets of scores (Pearson $r$ = .260). Univariate analysis of variance was conducted on each dependent variable (post-test, metacognition, essay) as a follow-up. Instructional differences were statistically significant for the post- test, $F$ (1, 36), = 13.88, $p <$ .01. Instructional differences were also significant for essay scores, $F$ (1, 36), = 16.67, $p < .001$. There was no significant effect of the treatment on students' perceptions of achievement, $F$ (1, 36), = 0.42, $p = .52$ (see Table 3). The results from this study provide evidence that using the VH as a web-based inquiry program to teach Canadian history can increase significantly students' understanding of the subject-matter and their ability to think and write historically, but there is no clear evidence of an effect on students' perceptions of learning (metacognition).

An examination of the standard deviations of post-test scores between the VH group (SD = 1.32) and the comparison group (SD = 2.41) also suggests more constant results among students in the VH group. The standard deviations of the essay scores show the same pattern: for the VH group SD = 2.52 and for and the comparison group SD = 4.43. These results indicate that responses from students in the former group were not as widely dispersed as in the comparison group, and thus closer to the mean score, indicating that the computer program helped produced more consistently positive outcomes among students of the VH group.

Discussion and conclusion

The purpose of this quasi-experimental study was to explore the role and impact of a digital

history program on students' historical thinking about a key episode in Canadian history. It can be argued from the findings with Ontario grade 10 students that if knowledge comprehension and historical thinking and literacy skills can be sustained by classroom teaching lessons, the use of the VH as an instructional program can help produce even more sophisticated thinking in the discipline among high school students. Results from pre- and post-instruction tests and argumentative essays indicate that students in the VH group have increased more significantly their conceptions of historical research and writing and their thinking about history than those in the comparison group.

But the data also reveal challenging findings and implications for history education. First, it is necessary to account for unusual differences in scores between the two populations on the various instruments used. A comparative analysis of mean scores from the essays (comparison group M = 8.64, VH group M = 14.80) and pre- and post-instruction gain scores (comparison group M = 7.64, VH group M = 8.50) suggest a significantly wider gap between the two groups in the essays. If students in the VH group clearly outperformed students in the comparison group in every aspect of their essay, why is this difference between the two populations not statistically significant when looking at gain scores from pre- to post-instruction tests? Indeed, as the post-instruction test was given in class to students the same day they return their essay, one would expect similar contrasts between the two groups. One factor that could explain this situation is the limited amount of information provided by students in the two tests and, as a corollary, the importance and level of thinking that they put into the writing of the pre- and post-instruction tests. As the essays were part of a culminating unit assignment on French-English relations, it is very likely that students did not consider the two research instruments to be "meaningful" for

their unit of study (as they did not count) and thus completed them without the same level of thinking, and perhaps enthusiasm.

The essay scores present also challenging findings for each respective group. As students in the comparison group were not directly exposed directly to primary sources about the October Crisis, it is predictable that few used historical sources for crafting their argumentative essays. Here it is worth noting that their essays were not coded on the number of historical sources referenced but on their ability to use multiple sources critically in the writing of an argumentation on the October Crisis. So the problem with this group is of a different order. It is the limited reference to and use of classroom material, and the heavy reliance on some internet websites ("Wikipedia" in particular) that must be scrutinized. Students' essays look as if they were crafted independently from their classroom lessons and activities. Despite the fact that the teacher presented the assignment and worksheets at the beginning of the unit of study, students seem to have taken very few notes in class and largely ignored textbook readings, teacher's lessons, Power Point presentation, and secondary sources used in the carousel activity. The great majority of essays appear to have been created entirely at the end of the week of study when students were provided with some additional time to visit the library and access the internet. Not surprising, students from this group have produced relatively simple and naïve argumentative essays with limited historical thinking about the controversial issue. Overall, only two students from this group wrote essays that are on or above the mean score of the VH group. One could hypothesize that the material presented in class (mostly informative and narrative in form) and the approach taken by the teacher did not convey significant meaning to students. As such, they only used classroom learning as background knowledge for crafting their argumentation, not as

relevant sources to support their claims. Similarly, as students have poor understanding of sources as "historical evidence" the great majority used internet sites as descriptive information about the October Crisis regardless of the provenance and reliability of the electronic texts.

On the contrary, students in the VH group used extensively the sources provided to them in the VH library. The problem with this group is the type of sources and the analytical approaches used by students. Without any exception, all essays focus exclusively on print sources from the VH library (e.g., Cabinet Minutes, letters, and newspaper articles) or from the additional web resources included in the VH library (e.g., Library and Archives Canada website). Although students had access to, and in fact manipulated several visual artifacts and dynamic texts (news clip, digitized photographs, satellite map, and historical poster), they considered them exclusively for computer entertainment.[3] Students acted as if visual texts could not be used critically to supplement, corroborate, or contradict print sources on the subject. Visual texts, as Walt Werner (2002) observes, continue to be "subservient to the written text, rarely taken seriously on their own. This is a mistake. It is not enough to teach *through* pictorials without also teaching *about* them" (p. 425). For example, the VH library contains an interactive street poster entitled "Reward $150,000" produced by the police forces during the October Crisis (see Figure 2). The poster presents key visual and factual information on four FLQ members (Francis Simard, Marc Carboneau, Jacques Rose, and Paul Rose) who kidnapped and killed Pierre Laporte such as sex, ethnicity, age, and occupation. These could have easily been used by students to describe more precisely and accurately theses domestic terrorists and their extremist movement born out of Québec's Quiet Revolution, and thus provide a more authentic and personal portrayal of the FLQ.

The analytical approaches taken by VH students also need further evaluation. Many have problems understanding that sources, whether they primary or secondary, must be questioned and analyzed critically in order to be used as historical evidence. Too often, the answers in the tests and the arguments presented in the essays reveal a limited ability to read beyond factual knowledge. Sources continue to be regarded as "pictures of the past" (that is, direct access to the truth) (see Dickinson, Gard, and Lee, 1980, p. 15). In either case, students typically fail to scrutinize the sources (compare, contrast, infer) and employ what Wineburg (1991) calls a "sourcing heuristic," that is the disciplinary practice of reading sources not only for what they purport to claim but what we can infer from them (p. 510). Part of the problem, as studies have shown repetitively, is the limited exposure student have to historical sources, and their heavy reliance on classroom materials, notably the textbook, which are typically written in a "readerly" (*lisible*) authoritative manner (Barthes, 1970). The predicable result is the inability of many students to work through the sources, even when they are provided with an instructional program geared toward authentic historical inquiry.

Indeed, the last aspect of the analysis is the role and impact of the VH on students' historical learning and thinking. I have argued that students from the VH group have significantly improved their understanding of the discipline and subject-matter. Recent U.S. and European studies also suggest that the use of appropriate digital technologies can increase students' historical interests, access to information, and historical skills development (Bain, 2006; Friedman, 2006; Spaeth & Cameron, 2000). This study confirms that the VH, as a digital history program, favours engagement with the subject-matter and focuses their attention on the

resolution of an historical investigation. Students in the VH group did not see a disconnection between the web-based inquiry and the writing of their argumentative essay as did students in the comparison group. More than this, they had the feeling they could investigate and go into greater depth in the study of a key episode in Canadian history. As student E002 puts it, "It's way better than reading from a textbook or other websites you can't be sure of." Student E007 goes further by arguing that "instead of being taught the topic, we learned it without [teacher] support, which I think helped me more in overall knowledge."

Yet, the present situation is far from comprehensive and satisfactory. On the one hand, the VH provides students with a multiplicity of conflicting sources for each historical investigation (for the October Crisis, students had access to over 20 different print and visual texts). Yet, far from being "swept in" by the richness and authenticity of the materials, some students appeared disoriented when they entered the virtual library and suddenly faced the "messiness" of the past. Instead of a neatly packaged story about the October Crisis, they were confronted with what seemed to them as a plethora of "writerly" (*scriptible*) texts with concealed meaning(s) that challenged their conventional, nonproblematic textbook narrative (Barthes, 1970). As student E021 expresses it, "the things I was reading was so confusing that it kind of makes me less willing to learn it." What became apparent in the computer lab on day 1 was the necessity of teaching students the skills to approach the landscape of the historical investigation, and to skim and summarize the sources and their interactive descriptions so as to identify efficiently the main arguments and big ideas of each text. Several students were initially slowed down, even discouraged by their textbook-type reading approach to historical sources. It was thus necessary to focus students' attention to the interactive description box embedded in each historical source

before engaging in textual analysis (see Figure 3). These boxes allow students to get in a snapshot a description of the source in terms of the type of source (what is it?), the provenance (where is it from?), the author (who produced it?), and the content (what is the focus of it?). Students were also reminded to use the additional scaffolding "clues" (graphic organizer with pre-reading questions and hints on the various sources) that allowed for more efficient reading of relevant sources for their essay writing. With this in hand, students could more effectively search and collect the necessary sources to structure their argumentative essay.

On the other hand, this digital history program, in its current design, does not allow for a completely interactive network environment as offered by client-server software. These powerful innovative technologies enable users to access and share online server-software than are typically available on stand-alone computers. The VH version 1.0, however, does not provide all the functionalities of a client-server program: create a personal account (Client Access License (CAL)), post and share information in real-time, draft and retrieve personal notes, allow for inter- and intra-textual search, manipulate web-based worksheets and graphic organizers, write and save personal, interactive text online with word processor formatting options. As a result of this, students still have to work with a mixture of conventional documents (print worksheets), online program tools and digitized sources, and finally a separate word processor to write their essay. While 21$^{st}$ century students have advanced computer skills and no difficulty navigating between multiple browsers, the current situation does not make efficient use of teacher's role, peer-sharing, and reading comprehension scaffolds that would facilitate students' engagement with the sources. That being said, the recent U.S. study of Saye and Brush (2006b) offers useful cautionary notes on the use of scaffolds. On the one hand, it is not clear from their multiple,

longitudinal studies that students exposed to inquiry-based learning gradually develop sufficient expertise in the domain to operate independently from learning support. On the other hand, even the most intensive and descriptive web scaffolds provided to students in their learning program proved to be inadequate. It may well be, as Robert Bain (2006) concludes, that "computer scaffolding does not substitute for instruction, but rather supports students in developing disciplinary habits…" (p. 113). As useful and powerful as they might be, computers and instructional programs cannot, at this point in time, replace effective classroom history teaching. Students who spend the great majority of their class time listening to lectures and reading from authoritative textbooks cannot magically engage in complex (or even simple) issues of the past using the tools and objects of the historians when exposed to technology. Teaching with computer technology must become a learning experience for *both* students and teachers.

<u>Notes</u>

[1] Some rare exceptions include the Great Canadian Unsolved Mysteries website (http://www.canadianmysteries.ca) framed around a detective approach to Canada's past and the McCord Museum of Canadian history portal for teachers (http://www.mccord-museum.qc.ca/en/eduweb/).

[2] The October Crisis of 1970 represents a significant episode in French-English relations in the Canadian history curriculum (Ontario Ministry of Education, 2005). The Front de Libération du Québec (FLQ) is a revolutionary movement born out of a decade of rapid and profound changes in Québec society (the so-called "Quiet Revolution" of the 1960s). The FLQ used propaganda and terror to promote the creation of an independent, socialist Québec country. To further their cause, FLQ members kidnapped on October 5, 1970 British trade Commissioner James Cross and, on October 10, Québec labour minister Pierre Laporte. The kidnappers' demands included the freeing of convicted FLQ members and the broadcasting of a manifesto. On October 16, the Québec government requested "emergency powers" and the assistance of the Canadian army to prevent an insurrection. The same day, the federal government proclaimed the existence of a state of "apprehended insurrection" and invoked for the first-time in peace-time Canada the War Measures Act (WMA). Under these emergency powers, the FLQ was banned, civil liberties were suspended, and arrests and detentions were authorized without charge. Over 450 persons were detained in Québec, most of whom were eventually released without any charge. Pierre Laporte was murdered by the FLQ during the crisis but James Cross released on December 3, 1970 following a joint police-military intervention. The FLQ officially ceased its activities in 1971. For more on the October Crisis, see *The Canadian Encyclopedia Online* (www.thecanadianencyclopedia.com).

[3] A multivariate analysis of variance (MANOVA) is a statistical method used for determining whether groups differ on more than one dependent variable. By using multiple dependent variables and a covariate, the MANOVA test can account for initial differences between groups (in this case pre-instruction test scores). A Bonferroni adjustment was also used to get a 95% confidence interval (alpha = .05) across all tests.

[4] Surprisingly, this finding contrast with the results of a study conducted with a related instructional program to teach U.S. history (PBHI). Saye and Brush (2006b) found that students not only used extensively their rich multimedia but believed these sources provided more authentic, direct windows to the past (p. 16).

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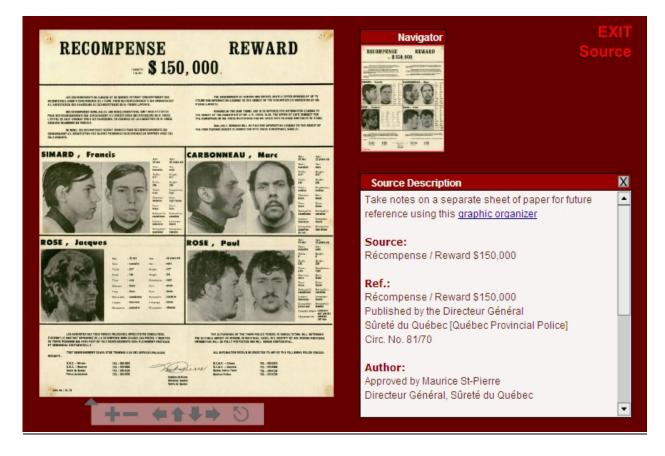
Figure 1

The Virtual Historian library (October Crisis, 1970)

Figure 2

The Virtual Historian "Reward $150,000" Poster (October Crisis, 1970)

Figure 3

The Virtual Historian Interactive Source Description (October Crisis, 1970)

Table 1

Mean scores and standard deviations for each variable by group

| Variables | Comparison Group | | Virtual Historian Group | |
|---|---|---|---|---|
| | Pre-test Mean (SD) | Post-test Mean (SD) | Pre-test Mean (SD) | Post-test Mean (SD) |
| **Tests (pre- and post-test)** | 2.17 (1.20) | 9.81 (2.41) | 4.12 (2.47) | 12.45 (1.32) |
| **Essay** | - | 8.64 (4.43) | - | 14.80 (2.52) |
| **Meta-cognition** | - | 2.30 (0.88) | - | 2.86 (0.88) |

Table 2

Multivariate Analysis (MANOVA test)

| Effect | | Value | F | Hypothesis df | Error df | Sig. |
|---|---|---|---|---|---|---|
| Intercept | Pillai's Trace | .914 | 119.969(a) | 3.000 | 34.000 | .000 |
| | Wilks' Lambda | .086 | 119.969(a) | 3.000 | 34.000 | .000 |
| | Hotelling's Trace | 10.586 | 119.969(a) | 3.000 | 34.000 | .000 |
| | Roy's Largest Root | 10.586 | 119.969(a) | 3.000 | 34.000 | .000 |
| **Pre-test** | **Pillai's Trace** | **.152** | **2.033(a)** | **3.000** | **34.000** | **.128** |
| | Wilks' Lambda | .848 | 2.033(a) | 3.000 | 34.000 | .128 |
| | Hotelling's Trace | .179 | 2.033(a) | 3.000 | 34.000 | .128 |
| | Roy's Largest Root | .179 | 2.033(a) | 3.000 | 34.000 | .128 |
| **treatment** | **Pillai's Trace** | **.452** | **9.367(a)** | **3.000** | **34.000** | **.000** |
| | Wilks' Lambda | .548 | 9.367(a) | 3.000 | 34.000 | .000 |
| | Hotelling's Trace | .826 | 9.367(a) | 3.000 | 34.000 | .000 |
| | Roy's Largest Root | .826 | 9.367(a) | 3.000 | 34.000 | .000 |

a  Exact statistic
b  Design: Intercept+Pretest+treatment

Table 3

Univariate Tests for each dependent variable

| Dependent Variable | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| **Essay** | **Contrast** | **203.336** | **1** | **203.336** | **16.666** | **.000** |
| | Error | 439.224 | 36 | 12.201 | | |
| **Post-test** | **Contrast** | **53.134** | **1** | **53.134** | **13.876** | **.001** |
| | Error | 137.848 | 36 | 3.829 | | |
| **Metacognition** | **Contrast** | **.304** | **1** | **.304** | **.418** | **.522** |
| | Error | 26.142 | 36 | .726 | | |

The F tests the effect of treatment. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

**LEARNING BY DOING: AN EXPERIMENTAL DESIGN
USING THE VIRTUAL HISTORIAN FOR THE STUDY OF THE OCTOBER CRISIS**

Questionnaire #1 (Pre-test)

1. <u>When</u> (date) did the October Crisis take place?

2. <u>Where</u> (location) did it take place?

3. Who were the <u>key persons/groups</u> involved in the October Crisis? (e.g., prime minister, minister(s), premier(s), mayor(s), group leader(s))

4. What <u>law</u> did the Canadian government invoke during the October Crisis?

5. What were the <u>consequences</u> of invoking this law?

6.  <u>Why</u> did the Front de Liberation du Québec (FLQ) use terrorism?

7. Is the October Crisis <u>important</u> to study in Canadian history? Why?

8. What do you <u>want to know</u> about the October Crisis?

9. What do you think <u>you will learn</u> about the October Crisis in this course?

10. <u>How interested are you</u> in learning about the October Crisis in class?

11. What does "<u>history</u>" mean to you?

12. How do you think <u>historians</u> study the past?

13. Can <u>different interpretations</u> (accounts) of the October Crisis be valid or "true"? Why?

## CODING SYSTEM (ESSAY)

**STRUCTURE**

Thesis :

0.0 Essay does not present thesis statement on necessity to invokeWMA

1.0 Essay presents vague thesis statement on necessity to invoke WMA

2.0 Essay presents clear thesis statement on necessity to invoke WMA

Composition:

0.0 Essay presents no clear development paragraph/arguments supporting the thesis statement

1.0 Essay presents 1-2 development paragraphs/arguments supporting the thesis statement

2.0 Essay presents at least 3 development paragraphs/arguments supporting thesis statement

Citations/References:

0.0 Essay does not include clear text citations (references) and bibliography

1.0 Essay includes some text citations (references) and bibliography (but unclear reference system or source information in text)

2.0 Essay includes all text citations (clear source references) and bibliography

TOTAL  /6

**CONTENT**

Factual information:

0.0 Essay does not present clear historical information on Crisis (when, where, what happened during Crisis)

1.0 Essay lacks information / contains some inaccuracies (when, where, what happened during Crisis)

2.0 Essay presents clear information / no major inaccuracy (when, where, what happened during Crisis)

Historical actors:

0.0 Essay presents no or only 1-2 actors/group in the Crisis (Trudeau, Bourassa, Drapeau, Laporte, FLQ, etc)

1.0 Essay presents some (3-4) actors/groups (key actors in the Crisis (Trudeau, Bourassa, Drapeau, Laporte, FLQ, etc)

2.0 Essay presents many key actors (over 4) in the Crisis (Trudeau, Laporte, Bourassa, Drapeau, FLQ, etc.)

TOTAL  /4

**THINKING**

Argumentation:

0.0 No clear argument (for or against) / Arguments not supported by appropriate sources (presented in class, found, or from VH library)

1.0 Arguments vague or not always supported by appropriate sources

2.0 Clear arguments always supported by appropriate historical sources

| Number of sources: | 0.0 No historical source (primary and/or secondary) used to make argumentation |
| | 1.0 Only 1-2 sources used to make argumentation |
| | 2.0 Use 3 or more different sources to make argumentation |

Use of sources:  0.0 Does not use historical sources to make argumentation. Present only personal statements and opinions.
1.0 Use sources as "facts" (true), no question (primary/secondary, who, when, where, perspective of author)
2.0 Use sources as "evidence" (consider primary/secondary, who, when, where, perspective)

Historical perspective:  0.0 Does not contextualize sources / does not recognize actions took place in 1970 using knowledge of the time. Assume students and historical actors can think the same way.
1.0 Recognizes actions took place in 1970 but see differences only in terms of "opinions" (actors vs. students). Sources are all the same.
2.0 Recognizes that actions took place in 1970 using knowledge of the time. Things might be different today. Historical actors differ from students today. Sources need to be contextualized.

Moral judgement:  0.0 Sees their personal statement (position) on the WMA as the ONLY possible outcome to October Crisis. Inconceivable to think differently (now and then)
1.0 Sees their personal statement (position) in terms of personal "opinions" (all positions are equal).
2.0 Sees their personal statement (position) as a possible outcome to the October Crisis considering sources, context, analysis, and judgement.