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Abstract :

This article discusses the integration of ICT to support the teaching and learning of history in secondary schools. I describe nine projects which were tested in Canadian, American and European schools. I also present principles for designing computerized teaching environments suitable for teaching and learning history, true to the nature and objectives of the discipline of history.

Introduction

Since Comenius in the 17th century, didacticians and pedagogues have been committed to developing the most effective means of enhancing learning. This paper describes the use of several of the principles formulated by Comenius to implement an original and effective system that could be used as a universal teaching tool.² These principles include:

1. One learns how to forge while forging just as one learns how to write while writing.
2. One learns while doing.
3. One should use his former knowledge before launching out in new apprenticeships.
4. One learns better starting from settings in similar situations.
5. One learns better when trying to find the causes of his difficulties.
6. One learns when the things to be learned are interesting and seem useful.
7. Cranium stuffing is a futile and sterile activity.
8. We learn when we succeed in establishing links between knowledge.
9. One learns better when concrete objects of training are used (to teach the words with objects, illustrations).
10. It is more valuable when more than one sense is utilised.
11. We learn when one has pleasure in doing so.

12. To learn, one should not only be an observer.

At the beginning of 17th century Comenius proposed the design of illustrated books which were to contain all that was necessary for pupils to grasp the factual knowledge required by apprenticeships. Utopian in vision? In fact, what he wished was that the books would contain as many illustrations as possible related to texts likely to concretise critical concepts. If he had lived in the 21st century, Comenius would certainly have seized the occasion to integrate information and communication technologies (ICT) into the teaching and learning process. These tools, which were new in the 1990s, now permit the design of advantageous computerised teaching environments.³

1. Solutions to reduce the problems of the learning process

Common tools used by the majority of teachers in classrooms lend themselves to particular learning methods. Among these methods are those where the teacher presents a knowledge already developed (often using textbooks, or notes on the course) that the students must learn or memorise. The interaction between the teacher, the learner, the program contents and the intellectual skills required are generally limited to pedagogical interventions. The teacher asks questions and the students try to find the answers. There is little room for the formulation of hypotheses, for their verification in various documents, for the processing of data and their communication. These are skills that demonstrate the student's commitment to building his or her knowledge base.

2. ICT: New tools to learn and teach

With the advent of the World Wide Web there are now new tools and learning procedures that support the development of such skills. Information and communication technologies could prove to be advantageous because of their interactive and non-linear properties, highlighted by the hypertext technique that supports the construction of knowledge. This technique empowers the user, who proceeds to choose his paths. As cleverly stated by Nanard and Boksenbaum:

The reader of the WWW explores the Web. Not only is he a typical information "miner", but he is also a frantic miner because the machine made his pickaxe light. He scans the Web to find what interests him. He digs, takes a nugget of

information, looks at it and throws it either in his bag or rejects it. Above all, he does that quickly! Very quickly: he “surfs”.⁴

Conceived in 1945 by Vannevar Bush, an adviser of President Roosevelt, hypertext has the ability to link small islands of information⁵. It is up to the user to establish links in order to give them meaning. Hypertext is revolutionising knowledge relationships in a way not seen since the introduction of printing by Gutenberg in the 15th century.

The learner who has recourse to hypertext makes more decisions than the one who follows a hierarchical system (i.e., sequential) where all knowledge to be acquired is already built⁶. According to Shin, in a hypertextual environment, it is the reader who decides which directions to take, while the author exerts control only on part of the contents, and little on the sequence⁷. This hypertextual research is of an inductive type, as Rhéaume states:

In this context, knowledge is not deductive—not handed to learner, but inductive, i.e. based on experiments, the explorations and spontaneous constructions carried out in micro-worlds which are displayed on a computer screen subjected to the requirements of the programs used.⁸

Hypertext is not the only characteristic of these new supports inherent in ICT. The nonsequential process that they make possible also supports an increase in the autonomy of the learner.

3. A constructivist learning process

This hypertext method requires the renewal of the teaching techniques, the students being more active in their apprenticeship. More than 30 years ago, Piaget cherished a project that would make pupils more active. He recommended the exploitation of a learning process centered on the building of knowledge by the learners:

Doing free research and making a spontaneous effort on the part of the pupil will result in more retention of knowledge. He will acquire a working method, which will serve him all of his life and will unceasingly widen his curiosity without risk of drying it up.⁹

Piaget was going to become one of the pioneers of what it is called the “constructivist learning process” which would rally many researchers in education.

More recently, Glasersfeld, who is a contemporary leader of constructivism and a disciple of Piaget, supported the theory that a person knows what he knows because he built his knowledge from his own experiments. Glasersfeld defined constructivism:

It is an unconventional approach to the problems of knowledge and knowing. It starts from the assumption that knowledge, no matter how it be defined, is in the heads of persons, and that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience.¹⁰

Glasersfeld suggested that the student becomes, to some extent, the craftsman of his own apprenticeship. Moreover, Jacques Tardif in his work *Pour un enseignement stratégique*¹¹, has emphasised, with numerous examples, that apprenticeship is an active and constructive process—thus the expression “constructivist learning process”—calling upon the students’ prior knowledge, which is upgraded from newly processed information¹². David Jonassen¹³ followed in the same direction while supporting the idea that data processing is a process by which the data are organised in order to make them significant. Moreover, this mental activity cannot be simply transferred from one person to another without their being actively involved¹⁴. This means that to become knowledge, information must be integrated by the learners. To learn, one must commit oneself to the long process made up of a series of intellectual operations from data gathering to sorting, to analysis and synthesis of information selected, and, finally, to communication of the result of the search or the investigation. For these operations to be carried out, the learners must be interested in investing the required time and energy. The success of the process depends on their commitment. As for the teacher, far from being someone who imposes the memorising of established knowledge, his role will be to encourage the students to thoroughly involve themselves in their apprenticeship. To achieve this, the teacher will encourage the students to take a chance in formulating questions, formulating hypotheses of solutions and making interpretations that will lead them to exert their critical capacities on the societies that they will have to study.

This interaction between the teacher and the students was also studied by Vygotski who stated, in 1934, his theory of the “zone of proximal development”¹⁵, spearhead of what we call today socio-constructivism. This is the zone where a learner’s knowledge has plateaued, but could be increased with the assistance of other people. Therefore, the fact of considering the ideas of

others and of comparing them with his own favours a mutual construction of knowledge¹⁶, and allows the emergence of a community of learners.¹⁷ D.N. Perkins¹⁸ wrote on this subject: “It is the job of the constructivist teacher (or interactive technology) to hold learners in their ‘zone of proximal development’ by providing just enough help and guidance, but not too much.”

To carry out this objective, educators would have to negotiate the transition from teaching contents of programs to that of problem solving, where the students would no longer be passive receivers of information, but problem solvers—researchers who investigate problems.¹⁹ The teachers would cease being dispensers of established knowledge and instead become agents of assistance who present problematic situations and who encourage learners to mobilise their prior knowledge and their know-how in order to try to solve them. Information and communication technologies constitute powerful tools which support the construction of new knowledge while helping learners to track information—to process it and share it with others. This paper reports on experiments which have been conducted since 1995 and which relate to the integration of ICT with the teaching and learning of history at the high school level. These experiments led to the design of computerised teaching environments with the objectives of helping students of any age to learn and of helping teachers of any level to plan learning activities.

4. ICT to assist pedagogy and learning process

Quebecois researcher Robert Martineau and Americans Downey and Levstick observed that the current methods and teaching equipment used by teachers contribute to reduce students’ interest in studying history.²⁰ The search for ways to stimulate the will of the pupil to learn is not simple. At the Media Lab of Massachusetts Institute of Technology where Seymour Papert works, this question has been examined for several decades. Work of the researcher led him to conclude, without reserve, that “the apprenticeship comes from within. It comes from the personal interest”.²¹ Unfortunately, he specifies, this aspect is far from being encouraged at school. There is rather a tendency to “infantilize” the students by obliging them to learn only what one teaches them. Even if several researchers noted that the interest of the students is not sufficiently taken into account, there exist very few models describing a learning environment that could satisfy such a concern.

Could one conceive of an environment that would make it possible to carry out the desired changes in teaching, where the students deal with their apprenticeship, and express interest to do it? Among the researchers who recently studied the question²², Pierre Bordeleau²³, Bruno Devauchelle²⁴, Christian Laguerre²⁵, and Janet Ward Schofield²⁶ concluded that ICT gradually transform teaching practices while presenting enormous potential at the apprenticeship level. New relations are established between the teacher, his students and computers. Then, the teacher is not perceived as the one who does all the work, but the one who helps students to adopt the objectives of the training programs.

Other researchers suggest that “a longitudinal study over several years would probably make it possible to more accurately determine the evolution of the learning process of students having the usage of computers within the normal framework of the school activities”²⁷. Already a study of this kind led in the United States²⁸ during a two year period showed that teachers engaged in computerised teaching environments modified their teaching practices, passing from dispensers of factual knowledge to that of collaborators and trainers. This change in the relationship between teachers and their students modified the students’ vision of the school. Not only did they acquire a greater motivation to work, but they also had more pleasure in carrying out the tasks suggested. All these considerations force a further examination of the computerised teaching environments connected to the learning of history, both in Europe and in America.

The European Council published in 1998 a report using information technologies to improve the teaching of history.”²⁹ The experiments presented in the report following a conference held in Finland that wished to answer this question. Indeed, for a number of students, having recourse to ICT already constitutes, according to the report, a powerful motivation. Students use a computer at home and, therefore, can use the abilities and knowledge obtained at home when they are in class. ICT often oblige students to work in collaboration and to share their thoughts.³⁰ To illustrate how ICT can contribute to the improvement of history teaching, two case studies were presented at the time of this conference, one coming from Sweden and the other from Finland.

4.1. The Söder project

A CD-ROM designed and produced by the Department of Museums and Service of Archives of Stockholm was used as a database by groups of students. The students initially had to choose a

question and resolve it by making use of database about Söder, a poor district in the south of Stockholm. The Swedish experiment was conclusive for the teachers as well as for the students who

... spoke easily about their work and used PowerPoint to improve their presentations.... The fact that they chose their own research and completed it clearly helped them to better appreciate the nature of history. In addition, this learning process was a pleasant experience.³¹

The students became aware that they were studying history while working with real documents and not by memorising the information presented by their teacher. The fact of collaborating on the same task, of solving a problem that they themselves identified, of working on old documents and of using the computers for research purposes and for presentation contributed to motivate them to get involved in their apprenticeship.

4.2. The Monitoring of the Planet project

From a specific project carried out in several schools in Finland, “Monitoring of the Planet”, the students were to take steps to convince other students of the dangers caused by the conflicts which prevailed in Africa (the studied area). To get information about this area and the conflicts in progress, they consulted Web sites, using email to communicate between themselves and share their information. They also designed Web pages to illustrate the results of their learning process. This activity was aimed “at acquiring greater skills in the art of negotiation and decision-making”³². The students were therefore confronted with real problems and had to commit themselves to finding the most suitable solutions.

These two projects are good illustrations of how ICT can modify the learning of history: the students feel that they take an active part in their training. The ICT created the working tools, which enabled students to have access to the most recent data on their subjects, as well as communication tools facilitating and enhancing the presentation of their research results. These tools offer interesting resources for designing courses adapted to different styles of intelligence.³³

Additionally, four American research teams worked on the designing of didactical tools using ICT. The results of their work make it possible to believe that ICT represent very useful tools in

the learning process of history. These projects, whether they come from the United States like CAST³⁴ and IMMTS³⁵, Canada like CSILE³⁶ or Quebec like MODÉLISA³⁷, all aim at the same objective, which is the improvement of apprenticeship by focusing primarily on the learners.

4.3. The CAST Project

In 1996, the Center for Applied Special Technology (CAST) published the results of a study carried out with 500 pupils in grades 4 and 6 divided among seven cities in the United States. Half of these pupils had followed their courses of civic education through the Internet, whereas the other half had followed them in the traditional way, starting from the statements of their teachers, using their handbooks and their printed exercise booklets. The study showed that the pupils who had accessed to the Internet for the information retrieval, for the treatment of new information and for the communication of their syntheses had obtained much better results than those who had not used that technology. The evaluation of the pupils took into account their information management, communication and presentation of their ideas. The authors concluded that the use of the ICT in an educational environment “can help students become independent, critical thinkers, able to find information, organise and evaluate it, and then effectively express their new knowledge and ideas in a compelling way”³⁸.

During the two months of the study, the teachers observed that the pupils belonging to the experimental group found information more quickly than those who belonged to the control group. They also used a greater number and a larger variety of sources than the control group for the presentation of their work. Moreover, they noted that the use of email had helped their pupils to learn from other pupils and from contributors in the community.³⁹

4.4. The IMMTS Project

The experimental project led by Professor Lynn Fontana of the George Mason’s University required the participation of historians and experts in the learning process, particularly of the historian Barry Beyer. Under the name “Intelligent Multimedia and Thinking Skills” (IMMTS), this project was presented during the Congress of the National Council for the Social Studies (NCSS), held in Washington in November 1996 and attracted considerable attention. It aimed to

better equip the history teachers who will use ICT within the framework of their teaching. In the introduction of the project, Lynn Fontana explained that:

The Intelligent Multimedia and Thinking Skills (IMMITS) project will develop two sets of computer-based tools for social studies/history curriculum in middle school/high schools. These tools are carefully designed to promote and support the development of student higher-order thinking skills.

One set of tools is a software shell that integrates explicit instruction, modelling, inquiry, collaborative learning, and coaching/tutoring to assist students to learn skills in evaluation, analysis, synthesis, and application knowledge. Student learning entails the exploration of an ever-expanding set of multi-media resources (text, audio, video, graphic, photographic) in history.⁴⁰

The first teachware developed by this team related to slavery during the American Civil War⁴¹. The team's learning objective was to bring the students to define slavery and, while being supported by historical documents, to describe the life of a slave before and during this conflict.

To achieve this, the students were asked to:

1. Evaluate documents relating to slavery in order to judge their relevance, their accuracy and their credibility;
2. Analyse the historical documents presented from various media;
3. Synthesise the information from arguments and assertions, which will make it possible to make generalisations;
4. Develop a multi-media presentation, in order to communicate the acquired knowledge.

For this purpose, the pupils had access to a multi-media data bank—virtual files containing the firsthand documents on slavery starting with the period preceding the American Civil War. A glossary defining the historical and teaching terms was available to everyone. A list of bibliographical references indicated printed works, video-cassettes and websites, making it possible to explore the subject more thoroughly. The intellectual operations that the students were required to undertake encouraged them to make historical criticism, which constituted one of the objectives of training targeted by these history programs.

The project was tested in the spring of 1997 with pupils in grade 8. The teachers mentioned the intellectual and methodological gains achieved during the course of the experiment.⁴²

1. Usage of a variety of sources (historical documents used for the learning of an historical event, e.g., slavery in the 19th century);
2. Immediate accesses to updated material;
3. Collaboration established with other teachers and students working in other schools; and
4. Development of skills to facilitate early employment.

4.5. The CSILE Project

The project entitled “Computer Supported Intentional Learning Environment” (CSILE) was, according to its authors, the first system to offer a learning process based on collaboration between the teacher and the students. The first version of this system goes back to 1986 and consisted of a common database created by students and teachers via the Internet. The goals set by the authors were to create a learning environment which made possible the sharing of information between the teacher and students, and which made the collective knowledge of the class available to everyone, encouraging collaboration between the students in order to facilitate the apprenticeship. The students had to formulate dozens of questions, which were subsequently divided into five or six sub-topics: the class having been divided beforehand into groups, each one of them dealing with one sub-topic and responsible for communicating the results to the class. Thanks to this procedure, the students read, wrote and succeeded in sharing their knowledge. “[Students] read because they need to write, and they write because they need to share knowledge”⁴³.

Since the teachers expressed fear that certain important ideas could be neglected, it was necessary that the students absorbed the governing ideas of the subjects being studied. The designers determined the principal concepts to know, which were to be accentuated during the learning process. As observed by the authors, some students were not successful in completing the exercise within the prescribed time and, as a consequence, several of them experienced frustration. This was due to the fact that the task was spread over ten courses. But they also noted that, as the students worked out the questions, they modified their relationship with the subject

being studied, which, as Wells mentions, caused changes in the ways of approaching the learning process:

For example, changing the nature of the rules that prescribe the sorts of actions that the learner engages in and the expected outcomes, modifying the division of labour, or valuing other tools in addition to the textbook—for example, collaborative, exploratory talk—all create quite different activity systems, and ones that may encourage rather than resist student initiative and creativity.⁴⁴

A commercial version of CSILE, called Knowledge Forum 3, was designed in August 1997. The new environment, which is on the Web, allows students to use the working notes from their classmates and to perfect them. These new contributions enable the students within a community of learners to build the required knowledge.

4.6. The MODÉLISA project

In 1995, Jacques Viens, professor at the University of Montreal, designed the software named MODÉLISA based on research carried out by the designers of CSILE. That software was developed according to his doctoral thesis written at the Ontario Institute for Study in Education at the University of Toronto.

The software is network designed and comes in two forms: a project form reserved for the teacher who creates a databank on a subject, and a document form intended for the students who can create their own document. As explained by Viens:

The software Modélisa was conceived to accustom the students, starting from the higher grades of elementary school, to document a subject by themselves, to establish links between words and ideas and to present the information in written and graphic form.

The students must formulate precise questions, find the answers and organise the information collected in a visual way around key words. They thus learn how to report their knowledge, to lay down objectives, to conceive strategies to achieve these goals, to establish links between the data elements collected and to give a progress report on what they learned.⁴⁵

The interest in this approach is due to the fact that the students must constantly involve themselves with the subjects in which they study. They question their knowledge on the subject and they go looking for information by searching in a databank, using key words elaborated from

concepts connected to the study of the themes. The learning process made from key concepts is an interesting approach in that it enables the students to rebuild situations around abstractions that they have to absorb. The students, who, during the experiment, had to work on the Palaeolithic society, had to understand a series of concepts suitable for the subject. They achieved that by observing illustrations and by seeking their significance through the databank and references. The links made by the students between the used concepts permitted them to integrate new knowledge with their original knowledge, thus modifying their cognitive maps. Since they were to re-use these same concepts during the drafting of their synthesis, it became clear that they had assimilated them. This project promoted two important socio-constructivists characteristics: initially, those of community of learners, and then, that of self-teaching. The students had to produce data while working in a collaborative way and to share them with the other members of the class via the Internet. These data, produced by and for the pupils, constitute the basis of the body of factual knowledge to be mastered. Also, the pupils who took part in their construction acquired an intellectual skill which Viens and Amélineau called “collaborative self-teaching”⁴⁶.

These six projects, Sodër, Monitoring of the Planet, CAST, IMMTS, CSILE and MODÉLISA, propose nonsequential and interactive apprenticeship, which consists of teaching activities created from documents (written, illustrated, audio-visual) connected to each other, thanks to the technique of hypertext. These are two characteristics that should arouse greater student interest in the learning of history, giving them the urge to carry out the expected training. The students are then offered the means of carrying out nonsequential and interactive learning, thereby giving them more freedom to explore information and documents as well as making them more active in their history courses. Moreover, the two Canadian projects (CSILE and MODÉLISA) offer the students an apprenticeship based on concepts that they gradually control by wondering about their significance by searching for and analysing related documents, and by communicating the results of their research to the class, using the learned concepts. The fact that the students manage to re-use concepts shows that they have assimilated their significance and are able to employ them in other contexts.

Another aspect deserves our attention. Since everything is done within small groups, it stimulates collaboration between the students in accomplishing the task to be carried out. Collaboration is

not only the division of the required task, but also involves the collection of information and clues that will initiate discussions permitting each fellow member to increase his level of knowledge of the subject studied.

To make these projects even more effective and interesting, only two elements are lacking. The first element, highlighted by Laville⁴⁷, is to lead the students to commit themselves to achieving the task entrusted to them, by requiring them to formulate hypotheses to solve the problem. The CSILE and MODÉLISA projects approached this aspect by proposing an environment to the students in which they could formulate questions about a given set of themes. It would be a question of going a little further in the learning process so that the students do not limit themselves to questions comprising only one elementary level of difficulty. To achieve that, it would be necessary that the students project themselves into the characters of that era and communicate their interpretations as if they themselves were the characters which they study.

The second element goes with the design of the learning environment and the presentation of information. The use of cartoons to introduce a topic or a subject will attract students' attention and stimulate their interest. Therefore, they will pay more attention to the interactive scenarios presented to them. The expected result would be to create a pleasant and relaxed atmosphere favourable to problem-based learning. It is very important to create such a learning environment, where the students have to formulate a hypothesis, therefore exploring possible answers by trial and error. Unfortunately, fear of making "errors"⁴⁸, which is too often associated with failure and bad school performance, makes the students reluctant to participate and to provide answers⁴⁹. On the other hand, in an environment where errors are permitted, the students find themselves more at ease in solving the problems with which they are confronted⁵⁰. One of the strategies which proves to be effective in removing the tension is the use of humour, which opens new avenues of communication. As Teslow explains it, "Sensitively-used humour can create a comfortable environment where anxieties are released, stress is relieved, and learners take risks— understanding that it is acceptable to make mistakes"⁵¹. In this way, the students would be more interested in their learning process, so the acquired knowledge would not remain passive as is so often the case in school.⁵²

The relevance of the six studied cases (Sweden, Finland, the United States, Ontario, Quebec) is due to the fact that they propose common ways to proceed, which are summarised in the following classification inspired by those of Harris⁵³ and Séguin⁵⁴. This classification of the intellectual skills that one should find in teaching scenarios consists of six categories:

1. Interpersonal communication supports exchanges between peers and the teacher in order to carry out the collaborative learning process;
2. Gathering data makes it possible to retrace clues relevant to the resolution of the problem;
3. Resolution of problems makes it possible to discover a solution with decreased difficulty;
4. Use of resources makes it possible to exploit the tools to help retrace relevant information;
5. Electronic documents make it possible to exploit the interactive dimension of ICT, namely the use and production of information; and
6. Self-teaching makes it possible to take steps supporting the development of intellectual autonomy.

It is in this constructivist spirit that I designed an *electronic book of general history* and the module of *Peace and Conflicts* that could meet the above mentioned goals and help high school students familiarise themselves with historical thought..

5. Experiments undertaken since 1995

5.1. The electronic book of general history

This electronic handbook⁵⁵ is addressed to junior high school students and consists of three tools that enable:

1. information retrieval
2. data processing
3. sharing and communication of information.

Information is the raw material that the student will use to develop knowledge and to acquire the intellectual skills aimed for by the General History program. I proposed a learning process in

which the students could choose their own paths and learn how to build on their knowledge. Contrary to the traditional printed handbook, these paths do not have a prescribed starting point, but they must promote the achievement of the mission suggested at the beginning of the chapter.

This learning process comprised the following five stages:

1. To dissect the statements explaining the assigned mission
2. To formulate hypotheses based on former knowledge and their intuitive knowledge
3. To locate (“to track”) useful information in the proposed scenarios and in the available documents
4. To process the data (i.e., classify, analyse and establish the links between the raised concepts), and
5. To communicate the results in the form of interpretations by empathising with a character of that era.

The process initially consisted in choosing a society while clicking on one of the following hyperlinks:

- Palaeolithic society
- Neolithic society
- Egyptian society
- Greek society
- Roman society
- Medieval society

Then, by clicking on “TA MISSION” (*your mission*), the user read and tries to understand the meaning of the mission. If the meaning of the latter remains incomprehensible or if the students want more details, the following activities can help. Going back to the home page of the chosen society, the student will click on the section “PRÉPARATIFS” (*preparation*), under the link “INTRODUCTION”. One finds a short description of the society and its principal characteristics. While clicking on various hyperlinks, one has access to illustrations or definitions likely to improve comprehension of the society.

In the section “PRÉPARATIFS” (*preparation*), one can also click on the link “QUE SAIS-JE?” (*What do I know?*), which assists in reviewing one’s own knowledge of that society.

Before starting the exploration of the data bank, one should be aware that there is an electronic MEMO PAD in which to write the clues that would be useful to accomplish the mission.

Information is in the section “ÉTAPES DU VOYAGE” (*itinerary*). There are interactive scenarios that include information, illustrations, charts, time charts and texts of that era that will provide helpful clues. Exploration can begin with any of these scenarios.

Data processing can then be carried out. The students could choose “PETITS DÉFIS” (*small challenges*) presented to them in the section “LES PRÉPARATIFS” (*preparations*). Students can formulate hypotheses relevant to the questions asked.

Then, they can face other challenges as those found in the section “TU TE DOCUMENTES” (*collected information*). There are:

- a. “DOCUMENTS D’ÉPOQUE” (*documents from that era*)
- b. “QUIZ 1”
- c. “TABLEAU SYNTHÈSE” (*summary chart*).

The section “TES BAGAGES” (literally, “*your luggage*”), will provide links to different web sites offering additional information on the chosen society.

There are also the “SÉQUENCES VIDÉO” (*video clips*) which enhance certain characteristics of this society. Finally, there is the “TABLEAU DES SOCIÉTÉS) (*table of societies*) where the principal characteristics of the society are summarised. At the stage of communicating their interpretations, the students will have the possibility to debate their newly acquired knowledge with their peers to test the viability of their conclusions. In the section “TU TE DOCUMENTES” (*collected information*), by clicking on “JEU DE RÔLE” (*role play*), the students can empathise with one of the characters of that era. They email their text to the address given by their teacher.

By using this method to explore the electronic book of general history, the students, strong or weak, show more interest in navigating the interactive scenarios⁵⁶. They are initially attracted by the amusing approach of cartoons, then by the practical aspect of information provided by the

hypertext technique. The various tables and conceptual diagrams that the students have to supplement force them to establish links between the various concepts. Finally, they are more involved when they empathise with a character of that era, understanding that there is no set way to retrace the information needed to fulfil their mission. We worked on the electronic handbook from January 1996 to August 1998.

5.2. The learning module: Peace and Conflicts

This learning module⁵⁷ was designed and produced in 2002 by a team of history students at the bachelor's and master's degree level as well as by education students at the PhD level. The team worked under this writer's direction, with the contribution of Professor Leon Robichaud of the Department of History and Political Sciences at the University of Sherbrooke. Professor Robichaud specifically studied the way to integrate ICT into this computerised teaching environment.

The learning module entitled "Peace and Conflicts" refers to conflicts that happened throughout Canada from its origin to the present day. We documented 36 of these conflicts, of which 24 were retained and can be used starting within a problem-based approach. These conflicts address the four great periods of Canadian history, which are the pre-European societies (First Nations), the French regime (1534 to 1763), the British regime (1763 to 1867), and the contemporary period (1867 to now). Peace and Conflicts focuses mainly on high school and college students, but also includes others interested in Canadian history. Teachers also find it a stimulating and interactive working tool that could be used in many ways.

5.2.1. Description of the learning module

Peace and Conflicts was designed and conceived in accordance with a constructivist approach that advocates the building of knowledge in which the focus of training is on the learner. To involve him in his learning of Canadian history, we suggest activities that have meaning for him. This is why we decided to introduce students to history through the metaphor of an investigative journalist. Thus, starting from a mission, the learner has to forge an opinion based on historical documents related to a particular event. He then has to write an article that could be accessible on line to his classmates or to students from other classes. It is a question of encouraging discussions between learners, no matter where they are in Canada or in the world.

5.2.2. A simple process

The process consists first in introducing the learner to the situation. He knows that, as an investigative journalist, he will have to evaluate available documents, as well as additional documents that he will randomly obtain throughout his research. He has to collect as many available sources as possible in order to produce a leading article based on arguments that are supported with accumulated data, which will be subjected to public opinion.

Moreover, the learner has access to press kits that summarise the conflicts and present some of the actors. He is informed of the situation prevailing at the time of the conflict and can consult a brief document describing the studied conflict. These documents contain hyperlinks that lead to biographies, charts, definitions, illustrations, time charts and web sites dealing with the conflict. Thanks to that complete documentation, the student-investigator can create his own opinion on the conflict and share it with the other students of his class, his school or any school in the world. Our objective was to emphasise the various points of view resulting from the conflicts that forged that country's identity. Our apprentice journalist may also receive additional documents from his teacher. Once the student completes the exploration of the data, we invite him to produce an article presenting his views on the conflict, which could be posted on the web site, so that other young people worldwide can interact on this subject. From these articles, we encourage discussion through a student forum dedicated to the conflicts.

5.2.3. The development of historical thought

Since this module was mainly designed for the learning of history, our objective was to permit the learners to achieve historical thought. Historical thought develops by putting into practice the various stages of the historic method. Thus, we want the student to:

1. Identify and understand the problem with which he is confronted,
2. Formulate one or many hypotheses (as well as accepting or rejecting certain assumptions which are proposed to him) initially formulated in an intuitive way since the hypotheses were drawn from previously acquired knowledge,
3. Methodically proceed with the gathering of data aiming at confirming the original hypotheses,

4. Process the data using various crosschecks between the available documents,
5. Review the initial hypotheses and decide if they confirm or counter their first conclusions and if need be, formulate another hypothesis of resolution,
6. Produce a summary of collected information, and
7. Present his conclusion to his peers.

After producing his article, the student-investigator moves toward the student forum, where his vision will be debated with other students. This should favour even more the development of critical thought.

5.2.4. User guide

Throughout this process the class retained the metaphor of a newspaper office where the bureau chief asks his journalists to investigate conflicts within Canada throughout its history. These conflicts were grouped under five sections: justice, globalisation, sovereignty, development, and governance. These five sections were subdivided into sub-topics, each containing two conflicts, which we retained for their relevance.

The sections, sub-topics and conflicts included:

Justice:

1. Minority Rights: The Caraquet Riots, The Metis Rebellion,
2. Land Appropriation: The Disappearance of the Beothuks, The Deportation of the Acadians,
3. Women's Movement: The Persons Case, The Integration of Women Into the Workplace,
4. Internal Problems Caused By World Conflicts: The Conscription Crisis of 1917, The Internment of the Japanese during World War II;

Globalisation:

1. Border Conflicts: The Seven Years War, The War of 1812;
2. International Conflicts: The Battle of Vimy Ridge;
3. Peacekeepers: Peacekeepers in Rwanda; Peacekeepers in Bosnia;

Sovereignty:

1. Nationalism and Separatism, The Rebellions of 1837-1838
2. The October Crisis;
3. Native Claims: The Oka Crisis, Ipperwash;

Development:

1. Free Trade; The Reciprocity Treaty of 1854. The 1989 Canada-U.S. Free Trade Agreement;
2. Socials and economics problems: The Winnipeg general strike; the “On to Ottawa Trek”;

Governance:

1. The Constitution: The Patriation of the Constitution, The Meech Lake Accord

The students who embody journalists must propose one or several interpretations likely to help future readers to better understand the stakes and impacts of these conflicts on Canadian history. From selected documents of that era, the student-investigator has to look for indications of divergent ideas. To do so, he must answer three questions:

- What do you think of the positions adopted at the time of these conflicts?
- If you had lived at that time, what would have been your position on these conflicts? Explain why.
- Knowing that the current situation is not the same, do you believe that similar conflicts could happen today? If so, which position would you take? If not, explain why.

With these questions, we want the students to be involved in the search for information likely to help them to understand the causes and the outcomes of those conflicts which were solved in such a way by men and women living during a different era. These people were influenced by their own prejudices and by situations over which they had no control. This leads the students to understand that the study of history is extremely complex, since the information that reaches us from the past is not only incomplete, but also biased. Criticising accessible documents from the past is a complex task.

Once the interpretation of the student is presented in the forum of discussion, he can expect the feedback of his peers, which will enable him to refine his judgement and to develop his critical thought. Let us note that the knowledge to be acquired is not already built, but is created from small islands of information contained in definitions of concepts, texts of time, illustrations and maps, which are displayed thanks to the hypertext technique. From the selected information, the student is invited to propose one or more interpretations, which summarise the extent of his knowledge of the said society.

5.3. The Romanization

This learning module on the phenomenon of Romanisation was designed and carried out in collaboration with high school teachers, education advisers from the Montreal School Board and teachers from the universities of Montreal, UQAM, Laval and Sherbrooke. The environment addresses first year Quebec High School students.

On a worktable, tools are available to students and teachers that include:

1. A global positioning system (GPS), as well as a compass and notebooks for the use of teachers to give intervention routes;
2. Two illustrations showing still visible traces of the Roman society to raise questions and debate on the concept of the Empire. They also have the objective to activate the students' prior knowledge;
3. An article, under the heading "Today" to unscure the concept that history is a science of the present. It brings students back to the general field of study, "Living together and Citizenship", and presents students with three subjects of discussion:
 - Citizenship, a privilege, yesterday and today;
 - Citizenship, a right or a duty?
 - Which duty of the citizen caused the death of millions of women and men in the 20th century?
4. A sheet of paper containing three "situation-problems":
 - "Can I be my enemy's friend?" This situation aims at the development of skills 1 and 2, which consist to question and interpret a social reality. It helps the student to question the context of that era.
 - "Romanise an empire". This situation aims at the development of skill 2, to interpret a social reality and to bring the student to work with a hypothesis.
 - "The State, a whole contract!" This situation aims at the development of skill 3, to build its citizen consciousness. It is a question of imagining a contract between the citizens and the state.
5. A computer keyboard, symbolising the creation of a virtual class, where the student can enter his work and his interpretations.

Finally, as a reminded by the authors of the learning module to students and teachers there is this explanation:

This site on roman history was developed for junior high school students and teachers.

The presentation is fragmented and proposes no precise plan... The contents and the tasks were organised to respect the spirit of the “program by skills”.⁵⁸

Conclusion

All these practices integrating ICT in supporting learning and teaching show that a new relationship toward knowledge is progressively taking hold in the field of education. ICT forces both students and teachers to proceed differently and to modify their practices involving research as well as treatment and communication of information. The hypertext technique, among others, allows us to isolate information, which can be reorganised in various ways by the users. Contrary to information, which is of the public domain, knowledge is of the private domain. That is why people do not all perceive *information*, which they read or listen to, in the same way. Their previously acquired knowledge causes them to process it differently. However, the transition from a sequential learning process, where everything was foreseen, to a learning process where learners have to resolve problems, does not happen without clashes. All these years of learning under a behaviourist paradigm, which was our situation, develop attitudes that are not easy to modify according to a socioconstructivist paradigm.

Acquisition of knowledge in history is a process that students enrolled in the bachelor degree in high school education must control. Once they become teachers, they will have to make sure that their students experience history rather than simply memorising it. Christian Laville wisely expressed it, 20 years ago, when he wrote “one learns how to walk by walking, not by watching an experienced walker; one learns how to argue by arguing, to carry out historian’s reasoning by reasoning history problems and not by memorising already made conclusions”⁵⁹. To do it, students from the high school teaching bachelor program must adopt the objectives of training, which are grouped under three great skills of the curriculum:

1. Questioning social realities

2. Interpreting social realities
3. Building a citizen consciousness.

One should not have a passive relationship with the past, but should consider its impacts and contributions on the present. Therefore, it is important to update the social realities of the past, as proposed in the module “Peace and Conflicts”. History is a hypothetical-deductive discipline, a discipline of interpretation based on documents from the past. It is then obvious that the first two skills can be found in the reference list of the history program. As for the third skill, it stresses the fact that we are the heirs of six million years of experience, which has enabled us to build the society in which we live. We are also reminded daily how much the social cohesion at which we arrived is very fragile. To maintain it, it is necessary to take an active part in the defence of acquired basic rights, often, at the expense of long battles and costly demands. Building knowledge is our aim and ICT constitutes an effective tool to achieve it. Then, why deprive ourselves by not using it?

¹ This article is based on the author’s doctoral dissertation entitled *Conception et mise à l’épreuve d’un manuel électronique d’histoire générale visant le développement de la pensée historique à l’aide d’une démarche constructiviste*, Université Laval, Québec, 2002.

² Jean Amos Comenius, (1632). *La grande didactique*. Traité de l’art universel d’enseigner tout à tous. Centre national de la recherche scientifique, Paris, PUF, 1952.

³ The author’s doctoral dissertation showed how high school students could benefit from ICT when studying history.

⁴ Marc Nanard and Claude Boksenbaum, “CD-ROM, or World Wide Web?” *Dans Mémoire Vive* (Bulletin de l’Association française pour L’histoire et L’informatique), no 14, déc. 1995, p. 13. Free translation by the author.

⁵ Jacques Rhéaume, " Les hypertextes et les hypermédias ". *Éducatotechniques*, vol.1, no 2, Québec, 1993, 13 p. [<http://www.fse.ulaval.ca/fac/ten/reveduc/html/vol1/no2/heth.html>]. p. 4.

⁶ Christine E. Shin et al., “Effects of Learner Control, Advisement, and Prior Knowledge on Young Students Learning in A Hypertext Environment”, *ETR&D*, vol. 42, No 2. 1994, p. 34.

⁷ The author of a document in hypertext cannot control all the contents with which the readers will be confronted since the hyperlinks which the document introduces can lead readers to information written by other authors, who propose in turn other hyperlinks.

⁸ Jacques Rhéaume, *op. cit.* p. 3.

⁹ Jean Piaget, *Où va l’Éducation?*, Paris, Denoël/Gonthier, 1972, p. 88.

¹⁰ Ernest von Glasersfeld, *Radical Constructivism. A Way of Knowing and Learning*, London, The Palmer Press, 1996, p. 1.

¹¹ Jacques Tardif, *Pour un enseignement stratégique. L'apport de la psychologie cognitive*, Montréal, Les Éditions Logiques, 1997. Tardif wrote: "Cognitive psychology makes it possible to better understand the construction of knowledge, how it is carried out, and consequently to plan the teaching and didactic actions most likely of not only facilitating, but also of causing the apprenticeship of the student. It does not matter his age and the school order in which he is registered." (p. 15). Furthermore, he adds: "An important principle of cognitive psychology is that the learning procedure is an active and constructive process. The person who learns does not remain passive in front of what is presented to him. On the contrary, by receiving information which comes to him from the outside, it does not matter which sensory receiver collects this information. He makes a selection." (p. 34).

¹² This question of the usage of previously acquired knowledge was studied by Judy D. Butler and Wilburn Clouse, in "Educational Technology and the Teaching of History: Promised, Practice, and Possibilities", report published in May 1994, base data ERIC, No ED 373.005, p. 2.

¹³ David H. Jonassen, "Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes", *ETR&D*, vol. 45, No 1, 1997, p. 69.

¹⁴ Glasersfeld holds similar remarks, as we underlined in the introduction.

¹⁵ Vygotski, Lev Seminovit, *Pensée et langage* (1934), traduit par Françoise Sève, éd. Sociales, Paris, 1985, pp. 269-270.

¹⁶ John R. Savery, and Thomas Mr. Duffy. "Problem Based Learning: An Instructional Model and Its Constructivist Framework". *Educational Technology*, Sept-Oct. 1995, p. 34.

¹⁷ Viens and Amélineau summarized the 12 socio-constructivists principles such as statements by the APA in 1995, and this revealed that the learning process is facilitated by social interactions; Jacques Viens and Catherine Amélineau, "Apprendre dans un environnement d'autoapprentissage collaboratif", *Cahiers de la recherche en éducation*, vol. 4, no 3, 1997, p. 341-342.

¹⁸ David NR. Perkins. "What Constructivism Demands of the Learner". *Educational Technology*, May 1991, p. 20.

¹⁹ Michael B. Eisenberg, "Free from the Constraints of Space and Time: Considering the Opportunities and Challenges for Electronic Publishing", *Educational Technology*, Sept. 1994, p. 62.

²⁰ Martineau, op cit., p. 231; Downey and Levstick, op cit., p. 406.

²¹ Seymour Papert, "La fin de l'école?", Une entrevue avec Seymour Papert réalisée par D.S. Bennahum, traduite par Bernard Mataigne et publiée dans *Édumédia*, no 10, 1996, 10 p. [<http://edumedia.risq.qc.ca/Revue10/Songe.htm#fin>].

²² Jerome Bruner, *The Process of Education*, Boston, Harvard University Press, 1960, p. 50; Jean Piaget, *Psychologie et pédagogie*, Paris, Éd. Denoël, 1969; Seymour Papert, *L'enfant et la machine à connaître. Repenser l'école à l'ère de l'ordinateur*, Paris, Dunod, 1994, p. 139, p. 150.

²³ Pierre Bordeleau, *Apprendre dans des environnements pédagogiques informatisés*, Montréal, Les Éditions Logiques, 1994; *L'École de demain à l'heure des technologies de l'information et de la communication*, (sous la direction de Pierre Bordeleau), Neuchâtel, LEP, 1999, 561 p.

²⁴ Bruno Devauchelle, *Multimédialiser l'école?*, Paris, Hachette Éducation, 1999.

²⁵ Christian Laguerre, *École, informatique et nouveaux comportements*, Paris, L'Harmattan, 1999.

²⁶ Janet Ward Schofield, *Computers and Classroom Culture*, Cambridge, Cambridge University Press, 1995.

²⁷ Josiane Basque et Martine Chomienne, dans Pierre Bordeleau (sous la direction de), *L'École de demain ...*, p. 326.

²⁸ Schofield, idem.

²⁹ The European Council. “L’enseignement de l’histoire et les technologies de l’information: Les technologies de l’information peuvent-elles améliorer l’enseignement de l’histoire?”. Séminaire européen d’enseignants, Espoo (Finlande), mars 1998, 16 p.

³⁰ Ibid. p. 3-4.

³¹ Ibid. p. 11.

³² Ibid., p. 12.

³³ Antonio D. Cantu, “A Year Internet Based Intelligences Model for Teaching High School History”. JAHc, vol. II, No 3, 1999, p.5.

[<http://mcel.pacificu.edu/jahc/jahcII3/K12II3/Cantuindex.html>]

³⁴ CAST (Center for Special Applied Technology), report written under the direction of Follansbee Sari, *The Role of Online Communications in Schools: national study*, Peabody (MA), 1996.

³⁵ IMMTS, “The Intelligent Multimedia and Thinking Skills”, software-tool designed under the direction of Lynn Fontana, the University of Pittsburgh, 1996.

³⁶ CSILE, “Computer Supported Intentional Learning Environments”, software-tool designed by Carl Bereiter, Marlene Scardamalia *et al.*, Center for Applied Cognitive Science, Toronto, 1986-1998.

³⁷ MODELISA, software-tool designed by Jacques Viens, professor at the University of Montreal, 1995.

³⁸ CAST, *op cit.*, p. 16.

³⁹ Ibid., p. 13.

⁴⁰ Fontana, *op. cit.*, “Introduction”.

⁴¹ A second teachware entitled “The 1850s: An Increasingly Divided Union” was conceived in 1998 by a team directed by Professor Fontana.

⁴² Report prepared by Katie Rowe-Labrecque in the Teacher’s Ideas section: “Technology Integration Plans”, 1997, 2 p. [<http://www.nac.gmu.edu/mmts/lebrecque.html>].

⁴³ Hewitt, Scardamalia and Webb, *op cit.*, p. 5

⁴⁴ G. Wells, “Discourse as tool in the activity of learning and teaching”, presentation submitted at the meeting of American Educational Research Association, New Orleans, 1994; the quotation was taken by Hewitt, Scardamalia and Webb, *op. cit.*, p. 5.

⁴⁵ Jacques Viens, “MODELISA c’est quoi?” Montreal, 1998, p. 4.
[<http://www.cosmo2000.ca/modelisa/offres.html>].

⁴⁶ Jacques Viens et Catherine Amélineau, “Apprendre dans un environnement d’autoapprentissage collaboratif”, *Cahiers de la recherche en éducation*, vol. 4, no 3, 1997, p. 339-371.

⁴⁷ Christian Laville, “Enseigner de l’histoire qui soit vraiment de l’histoire”, *Mélanges René Van Santbergen*, numéro spécial des Cahiers de Clio, Bruxelles, 1984, p. 173.

⁴⁸ Daniel Favre, “Conception de l’erreur et rupture épistémologique,” *Revue Française de Pédagogie*, no. 111, June 1995, p. 90; Bernard Sarrazy, “Le contrat didactique”. *Revue française de Pédagogie*, no. 112, Sept. 1995, p. 95.

⁴⁹ Jean-Pierre Astolfi wrote an interesting work on the subject. In the paragraph entitled “Your errors interest me!”, he writes: “The constructivists models, under strong development these last years, make an effort, contrary to the precedents, not to eliminate error but to confer a stature much more positive to it. We hear often that the set aim is always to focus on the productions of the students, but one admits that to reach that point, it is necessary to let errors appear—and even

sometimes to cause them—if one wants to succeed”. Jean-Pierre Astolfi, “L’erreur, un outil pour enseigner”, Paris, ESF, 1997, p. 15.

⁵⁰ A.M. Guérin-Grataloup et al., “Situations-problèmes et situations scolaires en histoire-géographie”. *Revue Française de Pédagogie*, March 1994, p. 35.

⁵¹ James L. Teslow, “Humor Me: A Call for Research”, *ETR&D*, vol. 43, no 3, 1995, p. 9. The author adds that it also applies to the teachers: “When teachers show that they have a sense of humor, and can laugh at their own mistakes, they are seen as human and approachable”.

⁵² Brent Wilson, David Jonassen and Peggy Cole, “Cognitive Approaches to Instructional Design”, in G.M. Piskurich, *The ASTD handbook of instructional technology*, New York, McGraw-Hill, 1993, p. 21. [<http://www.cudenver.edu/~bwilson>].

⁵³ Judy Harris, “Mining the Internet”, *The Computing Teacher*, vol. 22, no 5, 1995, p. 67.

⁵⁴ Pierre Séguin, “Internet: une technologie pour l’apprentissage”, 1997. [<http://www.virtuel.collegebdeb.qc.ca/pedagogie/>]. See the chapter entitled: “A classification in six categories.”

⁵⁵ The site is located at: <http://pages.usherbrooke.ca/manuel-histoire/accueil/manuel.html>

⁵⁶ We reported these data in our doctoral dissertation which aimed to evaluate the effectiveness of an electronic book of general history which was tested by 143 students divided in six classes. The results of the study show that the students carried out significant learning on the medieval society by building their knowledge in a collaborative way. Other interesting fact: the students of a group of particular advance drew their pin well even if they were subjected to the same exercises and the same rate of learning as their fellow-members of the five regular groups.

⁵⁷ One can reach this learning module at: <http://www.histori.ca/peace/index.do>

⁵⁸ <http://www.recitus.qc.ca/hist/rome/guide.htm>

⁵⁹ Christian Laville, op. cit., p. 173.