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The Virtual Scientific Conference (VSC):

A Metaphor for Authentic e-Learning in Higher Education

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Abstract

The goal of this chapter is to illustrate how the concept of "authentic learning" can be implemented in a web-based distance course. We present a collaborative e-learning scenario, inspired by socio-constructivist and situated learning theories, which encourages authentic learning. Developed as the main learning scenario of a graduate distance education course, it requires students to participate asynchronously in a simulation of an online scientific conference. We describe the learning scenario, the technological environment developed to implement this scenario, as well as some results of a course evaluation completed by students.

Keywords : e-Learning ; Online Learning; Authentic Learning;.Situated Learning ; Distance Education.

Introduction and Background

Over the last few years, online learning has become increasingly popular not only for distance education universities, but for campus-based universities as well. At the same time, all levels of the education sector have been undergoing a paradigm shift towards socioconstructivist and situated approaches to learning (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; McLellan, 1996; Orey & Nelson, 1997). However, maybe because of short deadlines or the absence of proper training on instructional engineering of e-learning, designers of web-based courses often tend to reproduce traditional teaching practices used in class. They tend to use teaching strategies reflecting a view of knowledge as being something that has to be transmitted essentially by the teacher, instead of something that has to be actively constructed by the learner. Thus, instructional designers are in need of new models and ideas to help them implement socio-constructivist and situated learning principles in the design of online courses.

Authentic learning is a mainstream approach suggested by many authors to support socioconstructivist and situated learning. For example, Duffy & Jonassen (1991) propose that students should use tools to perform activities which are similar to those found in their future professional fields. Savery & Duffy (1995) also highlight the importance of creating situations which let students practice the competencies required by the professional environments in which they will eventually be working. Herrington & Oliver (2000) make the following recommendations for the design of authentic learning environments: (1) provide authentic context that reflects the way the knowledge will be used in real life; (2) provide authentic activities; (3) provide access to expert performances and modelling of processes; (4) provide multiple roles and perspectives; (5) support collaborative construction of knowledge; (6)

promote reflection to enable abstractions to be formed; (7) promote articulation to enable tacit knowledge to be made explicit; (8) provide coaching by the teacher at critical times, and scaffolding and fading of teacher support; (9) provide for integrated assessment of learning within the task. Recently, Rule (2006) analyzed the content of 45 articles describing authentic learning in different disciplines and identified four overarching themes that repeatedly occurred: (1) real-word problems that mimic the work of professionals with presentation of findings to audiences beyond the classroom, (2) inquiry activities that practice thinking skills and metacognition, (3) discourse within a community of learners, that is, interactions and discussions with others learners, teachers, and professionals outside the learning community, and (4) student empowerment to direct their own learning in relevant project work.

Concrete examples of online authentic learning environments are still scarce (Herrington, Herrington, & Omari, 2002; Herrington, Oliver, & Reeves, 2003; Reeves, Herrington, & Oliver, 2002). In this chapter, we suggest a model for structuring all aspects of an online course at the graduate level, which, we believe, is a good illustration of how many of the authentic learning principles could be implemented in a virtual learning environment. The main idea is to have students participate in a simulated asynchronous virtual scientific conference (VSC). Few collaborative online activities reported in the literature use the scientific conference analogy to structure interactions amongst distant learners. Fjuk & Sorensen (1997) describe what they call "Pedagogical On-line Seminars", which consist of virtual forums moderated by a professor or an expert in a given domain. Clemson (2002) describes an online course including a "virtual poster session" as a typical activity of a scientific conference. This course is conducted in a synchronous mode and implies files sharing and chatting amongst students. In our course, all the

learners' interactions occur asynchronously and three main events guide the progression of the course: a virtual poster session, a symposium, and a plenary session.

Scientific conferences are events that graduate students, who are future high-level researchers and professionals, are likely to attend during and after their studies. Therefore, they need to familiarize themselves with the typical rules and practices of that type of event and to develop competencies in critical thinking, in formulating constructive comments, and in participating in scientific debates. Having them participate in a simulated scientific conference in the context of a course would then be a good strategy to help them develop and practice those competencies. This learning situation constitutes what Barab, Squire, & Dueber (2000) call a "practice field" or a "simulation model" of authenticity. This model is based on the assumption that a learning activity should be made as similar as possible to communities of practice outside of the learning situation. "This includes *factual* authenticity, in which the environmental particulars of the task are made to be similar to those of the real world, *procedural* or *process* authenticity in which learner practices are similar to those that one would be engaged outside of schools, and *task* authenticity in which that tasks being addressed are similar to those being undertaken by communities of practice" (Barab, Squire, & Dueber, 2000, p. 39). This model differs from the "participation model" proposed by Lave & Wenger (1991), which implies the immersion of students into an actual scientific community, and from the "co-evolutionary model" suggested by Barab, Squire & Dueber (2000), which brings together students, teachers, and members of a professional community to perform a common task.

In this chapter, we describe the instructional scenario of the VSC and the technological environment developed to implement this scenario within the context of a distance education course. We then report on students' perceptions and their level of satisfaction regarding both the

scenario and the environment of the virtual conference. We also discuss future trends on the issue of authentic e-learning. In conclusion, we synthesize and discuss the characteristics of the authentic learning model that we propose using the nine recommendations of Herrington & Oliver (2000) to design authentic online learning environments.

The Learning Scenario

The VSC learning scenario was designed and tested in a 135-hour graduate course entitled *Information Technology and Cognitive Development*, which is offered entirely at a distance at the Télé-université of Québec (www.teluq.uqam.ca), a French-Canadian distance education university. The entire course is structured around the metaphor of the scientific conference. The learning scenario, which we call the "Conference program", includes four main activities: *Preparing for the conference*; *Participating in a poster session*; *Attending a symposium*; and *Participating in the plenary session*.

In the first activity, students get acquainted with the conference environment and program and complete the conference "registration" process by presenting themselves to other participants. They also use a questionnaire to activate their prior knowledge related to the topic of the conference and are invited to begin building on this knowledge by reading some introductory documents on the subject. Finally, the participants use the virtual forum tool to discuss how those first readings begin to change their prior knowledge of the domain.

During the second activity, students participate in a virtual poster session where they produce a poster (using Microsoft PowerPoint) which summarizes the results of two published research papers related to the conference topic. Students can find the papers by themselves or may select them from a list provided in the VSC environment. This list can easily be updated by the

instructor. Each student must then write a comment or formulate a question regarding one of the posters produced. Finally, the posters' authors must reply to these comments and questions.

In the third activity, students participate in a virtual symposium about the effects of information and communication technologies (ICT) on learning and cognitive development. The papers presented at this symposium are, in fact, a collection of published papers which highlight various points of views from experts in the field. Thus, students "attend" this symposium and write a text in which they critique or defend one of the issues presented. Each participant must then comment on another's text, who, in turn, replies to the comments he or she receives.

In the fourth and final activity, learners participate in a plenary session that takes place within one of the forums of the course. The goal of this activity is to reflect upon and discuss the main ideas and conclusions they have gathered, as well as the knowledge and competencies they have developed as a result of their participation in the scientific conference.

All of the work produced throughout the conference (posters, debates, discussions in the forums, comments, and their replies) is used in the summative assessment of learning. Throughout the course, students are assisted by a tutor whose main tasks consist of moderating the forums, responding to questions submitted by email or posted in the forums, evaluating students' productions, and giving feedback to students.

The Learning Environment

The learning environment proposed to learners has two main components: (1) the course website and (2) the collaborative environment, which is accessible from the course website.

The Course Website

The interface of the course website replicates some aspects of a typical scientific conference website. For example, the main page of the learning environment presents the "Conference program" (*Programme d'activités*), which identifies the four learning activities and the four main assignments of the course (see Figure 1). Specific instructions on each activity or assignment title can be obtained on a click from this page. Students have access to the learning resources that they need to realize the activities and assignments (documents, Web pages, or software tools) by clicking on the hyperlinks integrated in the specific instructions related to each activity or assignment. Figure 2 shows a page which presents the instructions for the learning activity entitled "Produce my poster".

All the learning resources can also be accessed at any time from five menus located at the top of the main page of the learning scenario: *Self-management* (*Autogestion*) (personal profile, suggested schedule of the activities), *Information* (texts, bibliography, webography, etc.), *Production* (questionnaires, text editor, PowerPoint, etc.), *Collaboration* (group profile, conference rooms, forums, etc.), and *Assistance* (methodological or technical guides).

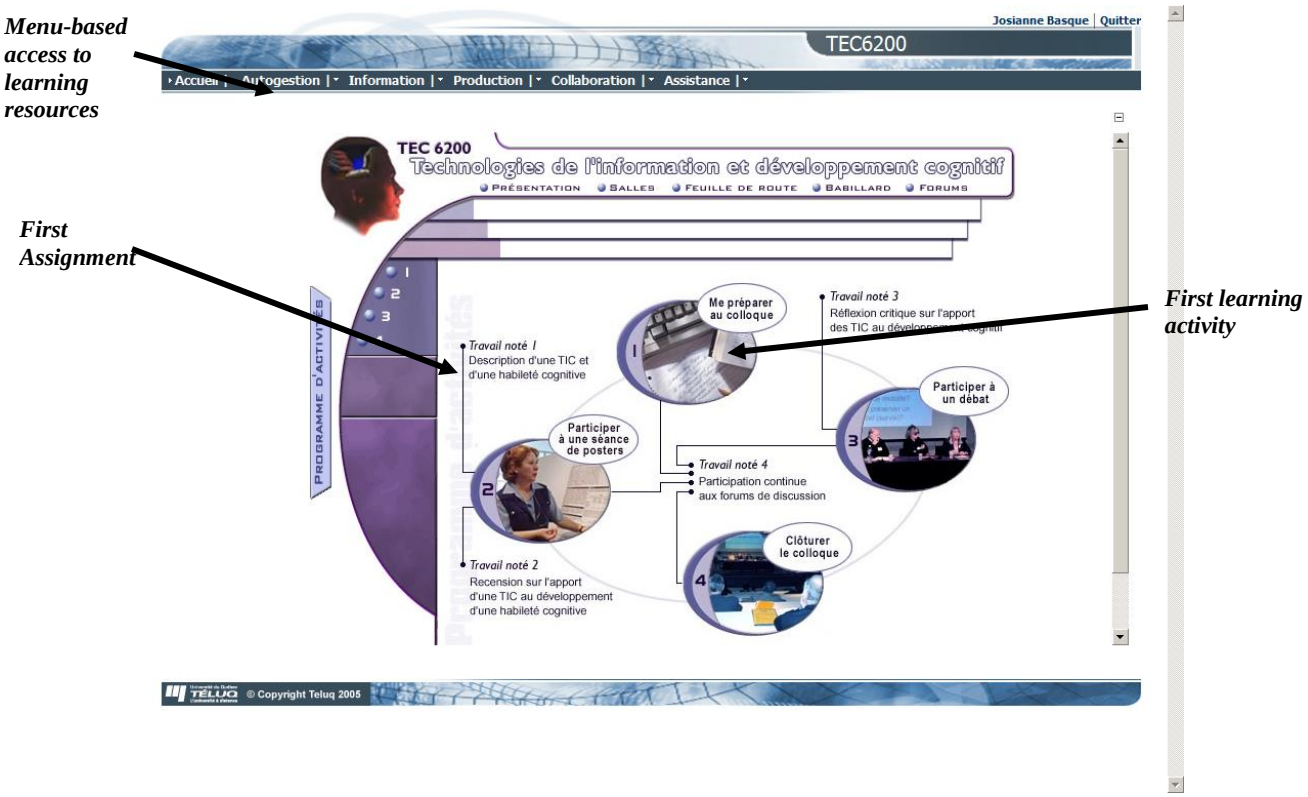

Fig. 1 – Main page of the scenario presenting the "Conference Program"

Fig. 2 – Instructions page for the learning activity entitled "Produce my poster"

The Collaborative Environment

The collaborative environment of the VSC includes a virtual forum and two interactive spaces, which have been designed at Télé-université, called the *Poster Session Room* (*Salle des posters*) and the *Symposium Room* (*Salle des conferences*). The virtual forum tool, an adaptation of the freeware phpBB (www.phpbb.com), is used mainly for spontaneous comments at any time during the course, for reflexive comments at the end of each activity, and for some structured interventions related mostly to the first and last learning activities. The two rooms of the VSC

are used to support file sharing and discussions during the *Poster Session* activity and the *Symposium* activity, respectively.

Unlike other collaborative learning platforms (Faerber, 2001), the VSC rooms are not structured according to a spatial metaphor but a functional metaphor which, according to some authors, is sufficient to induce a sense of immersion (Daele, Deschryver, Joye, & Peraya, 2000; Jensen & Heilesen, 2004). Harrison & Dourish (1996) argue that the critical property of computer-supported collaborative work systems "is not rooted in the properties of space at all. Instead, it is rooted in sets of mutually held, and mutually available, cultural understandings about behaviour and action. In contrast to 'space', we call this a sense of 'place'. Our principle is: 'Space is the opportunity; place is the understood reality'." (p. 67). The two virtual zones created for the VSC, although called "rooms", have interfaces that do not represent actual, physical rooms. Indeed, these two "rooms" are displayed as simple electronic tables which include various posting spaces.

Basically, both rooms are organized similarly and they offer the same functionalities. The *Poster Session Room* is illustrated on Figure 3. Both rooms allow users to post and display their papers and posters and allow for discussions about these documents. Users select an interface button to indicate the action they wish to perform; for example, they can post a file, view a posted document, ask a question, or make reply with a comment.

In order to ensure that all participants have the opportunity to receive and respond to a question or comment, a "first come, first serve" principle was implemented in the system. The buttons are displayed dynamically: they appear gradually, according to how the interactions unfold. This permits us to control the actions that each participant can do at any point in the scenario. For

example, as long as a posting area remains empty, a single button appears to all participants: the "Speak" (*Intervenir*) button. Once a participant has manifested his intention to "speak" in one of the posting spaces in a room, his name appears in the "Contributors" (*Intervenants*) column, and the "Posting" (*Déposer*) button appears in the column "Possible actions" (*Actions possibles*) of this specific participant only. Later, once the "Contributor" participant has posted his or her work, the "View" (*Voir*) button appears automatically in the same column, inviting all participants to view the contributor's posting. When a participant posts a comment or question concerning a poster, his or her name appears in the column entitled "Authors of the Questions" (*Auteurs des questions*). Finally, when the contributor responds, a checkmark appears in the column "Answered Questions" (*Questions répondues*). By selecting the "View" button, a single window appears where all participants can view (1) the contributor's poster or symposium paper, (2) the comment or question formulated by another participant, and (3) the contributor's reply.

Once a participant posts a file, it can be modified within a certain period of time which is fixed by the professor. When this delay has expired, the system prevents users from performing any type of modification. This feature ensures that students who prepare a response to another's work do not encounter a different document at the moment they are about to post their response.

The rooms have been developed in PHP-based Web applications and data is stored in a *MySQL* database. The rooms connect with the institutional instructional Management System (IMS) to assure the authentication of the students and tutor.

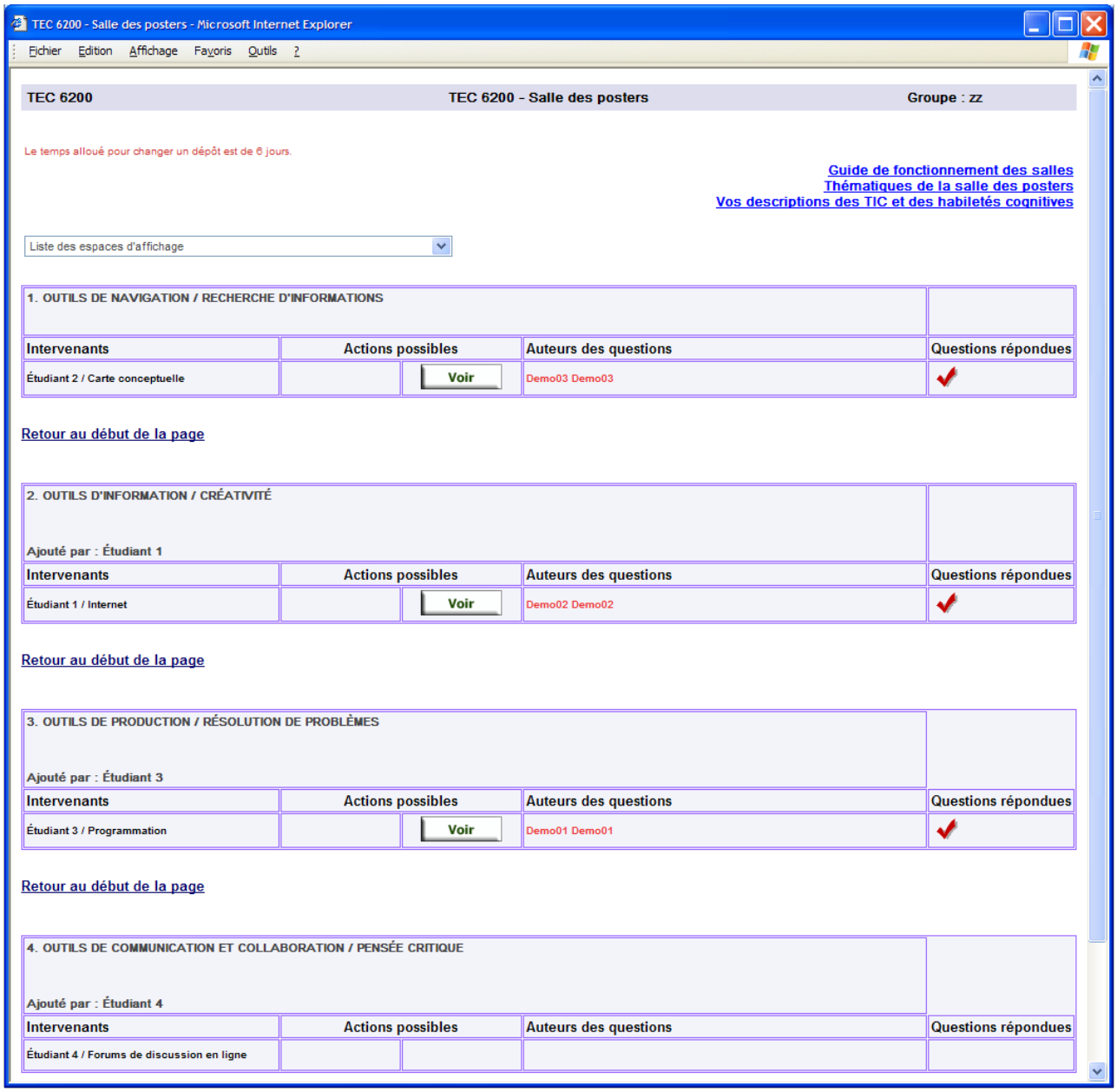

Fig. 3 - The Poster Session Room

Evaluation of the Course by the Students

At the end of the course, students are asked to volunteer their opinions by filling out a questionnaire anonymously. This questionnaire is designed as a formative assessment tool of the course in general and of its different components. It includes a section which specifically

addresses the VSC (15 questions). For this paper, we report the data collected from the first five cohorts of students. Twenty-two (22) out of sixty-eight (68) students have filled out and returned the questionnaire by email.[1] This response rate (32 %) looks low, but considering that distance students are not captive participants (as they would be on campus) and that they have no direct benefit from completing the questionnaire (e.g. bonus marks), we did not expect a higher response rate. As a comparison, a response rate of around 30 % is typical in e-mail surveys (Sheehan, 2001). We also examined the spontaneous comments regarding the VSC posted by students in the forums. The analysis of the data collected provides a portrait of the students' perceptions regarding (1) similarities between the VSC and other types of conferences, (2) technological aspects of the VSC, and (3) effect of the VSC on motivation and learning.

Perceived Similarities between the VSC and Other Types of Conferences

More than half of the 22 learners who filled out the questionnaire indicated they had previously attended a "live" scientific conference (N=13). Eight respondents said they had previously attended a *synchronous* virtual conference and nine said that they had participated in another asynchronous virtual conference aside from the one in question. These last results are startling as the virtual conference analogy is not widely used in e-learning. We hypothesized that students probably associated this strategy to various online collaborative activities, such as discussions in forums or chat, which are only a part of what we are proposing in this paper.

[1] To guarantee confidentiality, the completed questionnaires are sent to a coordinator, who transmits them anonymously to the professor.

Thirteen respondents felt that the dynamics of the discussions within the VSC was "very" or "moderately" similar to those occurring at live conferences (see Table 1). As one participant indicated, "*[i]t's not exactly the same as attending a live conference; however, discussions through the question-and-answer approach provide a close replica of these events*." Ten respondents indicated that they encountered the same dynamics at the VSC as those typically found in synchronous virtual conferences.

Statements	Very	Moderately	A little	Not at all	Don't know	TOTAL
The VSC reproduces the dynamics of the discussions in live conferences.	7	6	4	1	3	21
The VSC reproduces the dynamics of the discussions in synchronous virtual conferences.	6	4	3	0	6	19

Table 1. Results for the dimension "Perceived Similarities between the VSC and other types of conferences" (response frequencies)

In their comments, respondents mentioned certain advantages of the VSC compared to live conferences. For example, they noted that the information is available at all times, that participants can attend according to their own schedule, and that users can research a topic before getting involved in a discussion. "*In a live conference, it is difficult to gather all of the information. However, the asynchronous conference offers the possibility of consulting reference work and relevant documents"*, indicates a student. Others add that "*[t]he conference formula allowed me to attend the conference at my own pace"* and that "*[t]his approach provides us with the opportunity to research certain topics before responding."* However, some learners mentioned that the task constraints (i.e. only one comment related to each production) differ significantly from the reality of live conferences. Another person noted that participants must "*get into the game*" to really benefit from the experience. In fact, as it is the case when watching

science-fiction movies, the suspension of disbelief seems to be an essential condition to engage in virtual worlds (Hand, 1994) and, more specifically, in authentic online learning environments (Herrington, Oliver, & Reeves, 2003), at least in those that adopt the "practice field" or simulation model of leaning authenticity.

Technological Aspects of the VSC

Users had mixed reactions as to whether the rooms were user-friendly (see Table 2). To the statement "The organization and operation of the *Poster Session Room* are user-friendly", thirteen learners indicate that they "agree" or that they "strongly agree". However, many indicated they had difficulty understanding how to use the *Poster Session Room* which was the first one used in this course. Seven students indicated that they had technical problems using the VSC rooms. Two of them said they had difficulty posting their work and some mentioned that they disliked being prevented from modifying their files after it had been in a room beyond the allotted period of time.

Statements	Strongly agree	Agree	Disagree	Strongly disagree	TOTAL
The organization and operation of the Poster Session Room are user-friendly.	7	6	5	2	20
I had no technical problems in the VSC rooms.	6	6	6	1	19

Table 2. Results for the dimension "Technological aspects of the VSC" (response frequencies)

Many of these issues were brought up during the first semester the course was offered, which resulted in a number of modifications to the operation and aspect of the rooms. Furthermore, a

concise user guide to help learners navigate within the rooms was created and, if this is not enough, the tutor provides additional technical support to the participants, especially during the first activity held in the *Poster Session Room*.

Perceived impacts of the VSC on Motivation and Learning

In general, students have a positive attitude towards the VSC, which is considered a motivating and stimulating tool (see Table 3). Almost all respondents (20) feel that the conference analogy is stimulating and all (21) agree that posting their work and viewing others' work is a stimulating factor that favors learning. Most of them (17) feel that the peer discussions are very motivating, if not essential: "*In my case, it favored motivation, overachievement, collaboration and sharing expertise"*; "*Fantastic idea! We must act as experts, return to our assignments and reading, take a stand in front of the rest of the group…*" One indicated that one advantage of the VSC is that it "*allows learners to compare their knowledge with that of their peers"*. However, two respondents would have liked to see asynchronous activities supplemented with synchronous discussions.

All respondents enjoyed the virtual poster session (21) and most of them (19) felt similarly about the symposium. Furthermore, the majority (19) indicated that they would recommend the use of a VSC in other e-learning courses.

As for how students perceive the learning contribution of the VSC, all respondents confirmed that they had learnt from participating in the VSC, whether from the virtual poster session (21) or during the symposium (18). "*A wonderful synthesis!*", claimed one of the respondents. When asked whether they had learnt from the course overall, all respondents indicated that they had

expanded their knowledge “a lot” (19) or “moderately” (2). Furthermore, the estimated mean percentage of reaching their own learning goals was 92 % (SD = 2.11). Finally, 82 % (18) of the respondents would recommend the course to other students.

Statements	Strongly agree	Agree	Disagree	Strongly disagree	TOTAL
The scientific conference metaphor is stimulating for learning.	10	10	1	0	21
Having my productions accessible to others and having the possibility to view others’ productions is stimulating for learning.	17	4	0	0	21
The interactions with other students in the VSC (Formulate/Answer a question) are stimulating for learning.	11	6	2	1	20
I enjoyed the Poster Session activity.	18	3	0	0	21
I enjoyed the Symposium activity.	13	6	1	0	20
I would recommend the use of VSC metaphor in other distance courses.	11	8	2	0	21
I have learned from the Poster Session activity.	18	3	0	0	21
I have learned from the Symposium activity.	14	4	1	1	20

Table 3. Results for the dimension “Impact of the VSC on motivation and learning”

For learners enrolled in graduate studies, it seems then that the VSC scenario would integrate many characteristics of what has been termed “authentic learning” (Basque, Dao & Contamines, 2005). It seems to be an “*ideal formula to favor discussions in a distance learning course*”, as one student commented. Compared to other types of conferences, it is even seen as an advantageous avenue and it is considered a stimulating and motivating learning tool. Thus it

seems that most learners were satisfied with this experience and that they met their own learning objectives. However, we should be cautious with this conclusion, as our sample size was small.

Future Trends

Based upon these results, a list of recommendations and improvements has been compiled to enhance the VSC: (1) investigate the ergonomics of the room's interface; (2) reconsider the necessity of setting a time limit in order to prevent users from modifying a posted file while considering the discussion process; (3) review the scenario to allow for multiple comments on a single production; (4) prepare a more detailed description of the role of the tutor in the VSC, and (5) investigate possible adaptations of the VSC in other learning contexts.

Work on two of the five issues has already begun. First, we have elaborated the tutor's guide. This manual includes a description of the various tasks tutors must perform to ensure that the conference runs smoothly, tips to help students during the conference, tools to assist individual students or the entire group when problems arise, as well as various instructions to deal with difficult or delicate situations. Second, the VSC was integrated with another course at the undergraduate level. In one of the learning activities, students from different countries had to elaborate on a case study about biodiversity: each of them presented a poster of their case study in the *Poster Session Room* and posted their paper reporting on the case study in the *Symposium Room*. In this new scenario, students are the main "speakers" in the symposium, contrary to the initial design of this activity in the VSC. Moreover, each participant must comment on at least two papers or comments in each of the two rooms of the VSC, instead of only one in the initial application of the VSC.

The VSC has been designed and used as a "practice field" (or a "simulation model") of learning authenticity (Barab, Squire, & Dueber, 2000) in a distance education context. A full participation model would require students to participate in a scientific conference not only as attendees but as actual speakers. This would be difficult to implement because it would require all students to submit topic proposals to real scientific committees, which would then have to accept or reject them. Our students are not advanced enough in their graduate studies to satisfy those requirements. They first have to learn what a scientific conference is and how one participates in this kind of event. They also have to practice their communication and debating skills in a scientific context. Also, as Achtenhagen (2003) demonstrated with research data on commercial apprenticeships, "real life situations do not support effective learning per se. Authenticity must be set on stage – instructional design is one means to do this efficiently" (p. 2).

We think the VSC is a good transition leading to a pure participation model as proposed by Lave & Wenger (1991). The VSC could even be adapted a step further toward this model. For example, actual members of the educational scientific community could post real posters or oral presentations (text, video, or audio files) in the conference rooms and could reply to the students' questions and comments. In that case, students would interact directly with members of scientific communities, yet still in a "practice field".

The introduction of authentic learning principles in web-based courses is an issue that should be explored further, using sound and rigorous research methodologies. We need to know more about the conditions for success of authentic learning strategies for distance education such as the one implemented in the course presented in this chapter. Additionally, it is important to evaluate the impact of these strategies on learning.

Conclusion

In conclusion, we revise and discuss briefly the main characteristics of the VSC, using the nine recommendations of Herrington & Oliver (2000) to introduce authenticity in learning environments.

1) Provide an Authentic Context. According to Herrington & Oliver (2000), an authentic learning context reflects the way the knowledge will be used in real-life and preserves the complexity of the real-life setting. It must first be noted that the authentic nature of the VSC context does not touch on the targeted domain-knowledge specific to this course (learning and cognitive impacts of the use of ICT), per se, but more on the general knowledge and competencies required to participate in real-life conferences. Next, we believe that the complexity of the setting is preserved in that numerous resources are available in the learning environment and the exchanges remain dynamic despite being at a distance. However, the learning situation had to be somewhat simplified in order to satisfy the temporal and pedagogical constraints of a distance course. For example, the limits imposed to the number of comments which can be made about a poster (one per poster) are a definite difference as compared to an actual face-to-face scientific conference. Additionally, to prepare their posters, the students have access to a list of specific resources available in the learning environment, while the authors of posters must find their own references in a real context.

2) Provide Authentic Activities, For Herrington & Oliver (2000), authentic learning activities have real-world relevance and are ill-defined. Students perform complex tasks which can be integrated across subject areas, which engage them for a sustained period of time in

investigation, detection of relevant versus irrelevant information, and collaboration. They can also be given the opportunity to define the tasks and sub-tasks required to complete the activities.

As we have seen, the four learning activities of the course are entirely structured around the metaphor of the scientific conference. Students are then immersed in a complex and integrated learning situation for an extended period of time (15 weeks). Even though the theme of the conference is linked to a specific discipline, the tasks accomplished by the students (critical analysis, synthesis, etc.) are interdisciplinary. The students are called upon to consult multiple resources during the course and to select the appropriate information in order to reflect upon their productions. In this sense, the VSC activities meet the criteria of an authentic learning activity. The only criterion which seems loosely met is the one which states that activities should be ill-defined. Indeed, the learning scenario and the type of productions expected are defined explicitly in the VSC: the students do not define the goals and sub-goals of the activities themselves, although they choose the specific theme of their poster and debate paper, as well as the specific students' productions they want to comment. Such degree of structure would however reflect that of a real-world conference where the rules are very explicit (established deadlines, defined evaluation modalities, strict schedule, typical structure of exchanges followed by questions, editing norms for written texts, etc.).

3) Provide Access to Expert Performances and Modeling of Processes. This recommendation is respected in certain parts of the VSC but not in others. For example, in the *Conference Room,* the students have access to texts written by expert researchers in the field. They are also invited to view some examples of posters prepared by researchers available on the Websites of some real-life conferences. However, in both cases, they do not have the opportunity to access to expert thinking *during* the preparation of these productions. However, the VSC contains videoclips

filmed during a real face-to-face scientific conference which illustrate the discussions between a presenter and participants in the course of a Poster session; others demonstrate an author explaining to a participant how he designed his poster and providing tips. Herrington& Oliver (2000) also suggest to give access to learners in various levels of expertise and to have them share narratives and stories. We know students have diverse prior knowledge and competencies regarding participation in scientific conferences, more than half of the 22 learners who filled out the questionnaire having previously attended a "live" scientific conference. At many points in the program of the VSC, students are asked to share in the virtual forums not only their thinking related to the targeted domain-dependent knowledge but also their reflections of their experiences in the VSC.

4) Provide Multiple Roles and Perspectives. In the VSC, students are called upon to play multiple roles: creators and presenters of posters, participants to poster sessions, actors in debates, participants in a plenary session, etc. The information which is produced and presented in the VSC is accessible at all times: it is possible to consult the resources of the VSC whenever and as many times as desired. For the students, this was a definite advantage to a face-to-face scientific conference. Furthermore, the varied viewpoints expressed by all the students are shared within the VSC environment, allowing the expression of multiple perspectives on the topic addressed.

5) Support Collaborative Construction of Knowledge. The VSC support social knowledge construction through asynchronous interactions between students at the level of the whole group and not in small teams. We avoid describing our learning scenario as being collaborative or cooperative, which would imply, as George (2001) stated, an activity in which students grouped in small teams would follow common goals or sub-goal in the former or different sub-goals in

the latter. It seems to us that it is more appropriate to say that our learning scenario supports *co-construction of knowledge,* which implies that learners perform the tasks individually but share resources, negotiate meanings and confront their viewpoints on the productions of each other. However, this learning situation is not easy to manage in a distance training context. Thus, the asynchronous conference paradigm becomes problematic for students who require a course extension (for personal, professional, or health reasons, for example). Students who complete the course beyond the regular 15-week course time frame are alienated from the group and its activities. They are no longer able to participate in the discussions related to the documents (posters and papers).

6) Promote Reflection to Enable Abstractions to be Formed. After each learning activity, the students are invited to reflect upon their learning and the difficulties encountered during the activity and then share these in the discussion forums. A list of questions is provided in order to guide their reflection. In addition, sharing their products and their reflections on these productions offers multiple occasions for students to compare their own thinking with others. These activities are intended to promote self-reflection and metacognitive thinking.

7) Promote Articulation to Enable Tacit Knowledge to be Made Explicit. The VSC responds perfectly to the recommendation to encourage explicitation of tacit knowledge. Indeed, in the VSC, the products of the students are made public to the whole group and there is explicit encouragement for constructive criticism.

8) Provide Coaching by the Teacher at Critical Times, and Scaffolding and Fading of Teacher Support. During the course, the students benefit from continuous and asynchronous support from a tutor. This individual provides coaching, scaffolding, and fading depending on the emerging

needs of the group. Peers can also be considered to be a significant source of coaching through their mutually exchanged constructive criticism. However, the role of the tutor could maybe more fully be integrated in the metaphor of the scientific conference. For example, it would be possible to indicate that the role be more of that of a moderator in the *Conference Room* or that of a judge for "Best Papers Awards".

9) Provide for Integrated Assessment of Learning within the Task. All the productions of the students (posters, debate texts, comments, replies, discussion forum participation) are used for summative evaluation of learning. Assessment is therefore perfectly integrated into the VSC activities. The evaluation criteria for each production are made explicit to students. In addition, students have the opportunity to fine-tune their productions based on the feedback provided by the tutor, even though group management constraints limit the period of time allotted to modify these once they have been uploaded in the VSC rooms. In fact, we had to make sure that a participant who prepared a comment on another student's production did not find a new production when it was time to post his comment.

In summary, our analysis demonstrated that the VSC offers an authentic learning scenario and environment to higher-education students. Such an application would find a home in a virtual doctorate school. We have seen, however, that the context of the distance training restricts the use of some but few recommendations made by Herrington & Oliver (2000). It is apparently difficult, and almost undesirable, in distance learning models to apply the recommendation whereby the learning activities should be minimally structured. The reason for this is that student autonomy is favored and tutors are not the course designers. It is important, in this case, to carefully structure the learning scenario in order to guide the students in the course environment and to describe the activities and the productions expected in a detailed manner. In a way, such a

structure would enhance the authentic nature of the VSC in relation to a real face-to-face scientific conference where participants must follow explicit rules and participation modes.

Another limit to the authenticity of the VSC as a distance education environment relates to organization and management of collective activities which, despite the fact that they are asynchronous, require the sustained participation of students during a same definite period of time. This is somewhat contradictory even to the distance education model adopted in our institution, which encourages the self-management of learning schedule at the individual level within the 15 week period of a course, the possibility to register at all times, and the possibility to delay deadlines.

These restrictions are minor, however, and do not question the fact that we should continue to find innovative ways to implement authentic learning in online courses.

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Key Terms and Their Definitions

Authentic Learning:	As synthesized by Rule (2006), the concept of "authentic learning" refers generally to learning activities involving (1) real-world problems that mimic the work of professionals in the targeted knowledge domain; (2) open-ended inquiry, thinking skills, and metacognition; (3) discourse among a community of learners, and/or (4) learner empowerment through choices to direct their own learning in relevant project work.
Community of Practice:	"Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor." They are "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, n.d.).
Instructional Engineering:	Instructional engineering refers to the whole cycle of a learning system (e.g. a course, a module, a study program, etc.), from the initial analysis of the learning problem and context to the design, development, implementation, and evaluation of the learning system. The term "instructional engineering" is somewhat equivalent to the term "instructional design", although the term "engineering" highlights more explicitly the fact that the process borrows some characters of the one used to design products or services in engineering disciplines (e.g. systematic and systemic processes, search for coherence, of efficiency, and efficacy, etc.).

Metacognition	"Metacognition is a term used to describe people's knowledge and regulation of human cognition. Strictly speaking, metacognition refers to cognition about one's own cognition (…). Metacognition (…) differs from cognition in that cognitive skills are those that help a person perform a task; metacognitive skills are those that help a person understand and regulate cognitive performance" (Schraw, 1998, p. 91).
Situated Learning:	Situated learning refers to an educational paradigm which stipulates that learning occurs in a sociocultural context. Thus, the term « situated » refers not only to the immediate context of learning but to the whole culture in which the learning situation takes place and which structures the cognitive activity of the learners. Learning takes place when learners interact with others, and with concrete and symbolic tools, artefacts, and social practices in use in their cultural context.
Socio-constructivist Learning Theory:	Socio-contructivist learning theory emphasizes the role of interactions and collaboration between learners as well as between learners and the teacher or other members of the community in knowledge construction.
Virtual forum:	A virtual forum is a web-based tool for asynchronous discussions among a group of participants, usually centered on specific topics.