

Acceptance and Appropriation of Videoconferencing

for E-training:

an Empirical Investigation

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## Abstract

The purpose of this paper is to explore the acceptance and the appropriation of videoconferencing-mediated training during real training situations in a French company. We compare the acceptance and appropriation by 60 employees of two videoconferencing-mediated training systems : the virtual class (desktop videoconferencing) and the remote class (where learners are gathered together in the same room while the trainer is located at distance). In considering the acceptance of these videoconferencing-mediated training systems, a link was confirmed between perceived usefulness and the intention to use, but no relationship was established between the levels of acceptance and the required effort. The intention to use videoconferencing was associated with the expected benefits and not with the expected effort. Regarding appropriation, learners did not report a perception of technological distance. Moreover, we show that learners and the trainer preferred the virtual class rather than the more classical remote class. Our findings contradict the media richness theory, according to which the remote class, which is the “richer” medium in our research, should have been preferred.

Keywords : Videoconferencing, e-learning, appropriation, uses, ICT, training.

The increase in use of the Internet and information technologies has introduced new possibilities in the field of training, especially for remote training. In this context, videoconferencing seems to be a promising tool as it enables work in different locations while preserving the possibility of real time interaction between teachers and trainees. It is, therefore, important to study learners' perceptions and the first uses of this technology.

Specifically, this article focuses on the use of videoconferencing for training within a large organization, which is in the early stages of implementation of this new tool. The main topic of this chapter is the measurement of acceptance and appropriation of videoconferencing as a tool for professional training within a large French company. In this company, training is considered to be a very important and strategic part of HRM. The aim of professional training is to improve employees' skills in the context of rapidly changing jobs and recruitment of new employees.

Videoconferencing may be considered as a way of reducing travelling and the time required for the organization of training sessions, and of modernizing the company image for employees. At the same time it provides interactions between the learners and the trainer similar to face-to-face training situations.

Consequently, videoconferencing may become a useful tool of Electronic Human Resources Management. However, HR Managers in the company hesitated in implementing videoconferencing for training. They thought that employees (both learners and trainer) would reject it; for this reason, they wanted to explore employees' perceptions, attitudes and behaviors related to this new tool.

If HR Managers were to implement videoconferencing for training, they would need to know which was the more efficient type of videoconferencing that was preferred by employees. Actually, different types of videoconferencing technologies allow different types

of training (in a small group or in a large group, using transmissive or collaborative pedagogy). Virtual class (desktop videoconferencing) and remote class (where distant learners are gathered together in the same room, as in traditional classes, while the trainer is located at distance) are the main types of videoconferencing for training. We will measure the acceptance (learners' and trainer's perceptions and attitudes) and the appropriation (users' behaviors) of both types of classes. This question has not yet been developed in the literature. However, the effects of ITs on learning, and the effect of videoconferencing on interaction, have been explored. In the following section, studies on these two topics are reviewed.

### **Literature review**

#### **Information technologies and learning performance**

Several papers focus on the relationship between IT and learning. Their main question is, can an IT improve learning performance, and if so, how? Researchers are generally interested in how IT affects learning effectiveness. In this regard, some authors have shown that a technology's capabilities emphasized learning performance (e.g. Alavi, 1994).

Other researchers demonstrated that IT had no significant effect on learning performance (Alavi et al., 1995; Russell, 1999). For example, Alavi et al (2002) found that the learning outcome of an e-mail environment was greater than the learning outcome of a more sophisticated Group Support System environment. Mehlenbacher et al (2000) pointed out that there was no significant difference in student performance in the two learning situations (two web-based sections of a technical writing class and a conventional version of the class).

These outcomes are in contradiction with richness media theory (Daft & Lengel, 1984). For Clark (1994), learning effectiveness is enhanced by the teaching method and not by the technology itself.

According to Collins (1991), the way the instructor implements the technology is the determining factor for learning effectiveness. In this regard, some authors showed the

importance of the instructors' characteristics for increasing learning effectiveness: the instructor's positive attitude towards technology, the instructor's interactive teaching style and the instructor's control over the technology (Webster & Hackley, 1997) or the instructor's self-efficacy (Mathieu et al., 1993).

If the instructor's characteristics are important in explaining the effectiveness of technology-mediated training, the learner's characteristics may also explain different degrees of learning effectiveness. Benbunan-Fich & Hiltz (2003) showed that outcomes of online courses improved when professors structured them in order to support the growth of a learning community, by using collaborative strategies and being available online to interact with students.

Piccoli et al. (2001) found that participants in two virtual learning environments reported being less satisfied with the learning process. The authors suggested that this result might be explained by the lack of learning strategies that allow students to take advantage of the high levels of learners' control and flexibility that are available in virtual learning environments.

Several authors have explored various factors concerning learners that emphasize learning effectiveness in technology-mediated learning environments. Hiltz (1993) observed that collaboration among students, motivation, and student characteristics (level of academic ability, motivation, degree of effort and maturity) are positively correlated with learning performance in an asynchronous distance learning environment. Webster and Hackley (1997) pointed out that students' comfort with their onscreen image influenced behavior in asynchronous distance learning environments. Mehlenbacher et al. (2000) suggested that reflective, global learners performed significantly better on online courses than active, sequential learners, although there was no difference between them in the traditional class.

The same mixed outcomes are produced in studies focusing on students' satisfaction, which is another aspect of learning performance. Piccoli et al. (2001) found that students in a

virtual learning environment reported significantly higher computer self-efficacy than those in a traditional classroom. In contrast, Alavi et al. (2002) noticed no significant difference in the students' satisfaction with the learning process under the two distributed learning environments (a "simple" environment and a more sophisticated environment). Benbunan-Fich and Hiltz (2003) were interested in another type of technology-mediated learning, online courses. Their results suggested that there were no significant differences in the students' perceived learning associated with the delivery mode (totally online via asynchronous learning networks, traditional face-to-face courses, and sections using a mix of traditional and online activities).

Other researchers have highlighted the limits of virtual learning environments: the feeling of isolation (Brown, 1996), frustration, anxiety and confusion (Hara & Kling, 2000) as well as reduced interest in the subject matter (Maki et al., 2000).

A few recent studies have focused not only on the learning performance but also on the intention to continue using a technology-mediated learning environment.

Chiu et al. (2007) integrated the Information Systems success model and fairness theory to highlight variables that affect learners' satisfaction. They found that information quality; system quality, system use, distributive fairness and interactional fairness have significant positive effects on satisfaction. Other variables such as procedural fairness and satisfaction play significant roles in learners' intention to continue using Web-based learning.

Employing the Unified Theory of Acceptance and Use of Technology (UTAUT), Chiu and Wang (2008) showed that performance expectancy, effort expectancy, computer self-efficacy, attainment value, utility value and intrinsic value were significant predictors of an individual's intention to continue using Web-based learning; while high levels of anxiety exhibited a significant negative effect. These findings suggested the beneficial effect of

positive subjective task value in stimulating learners' intention to continue using Web-based learning.

### **Uses of videoconferencing**

Studies focusing on the use of IT have reached no definite conclusions on the efficiency of one particular medium compared to other media. While some studies assert that videoconferencing is as effective as face-to-face interaction, or more effective than audioconferencing (e.g. Valacich et al, 1994), others assert that videoconferencing has no significant effect (e.g. Alavi et al, 1995 ; Dennis & Kinney, 1998). In contradiction to media richness theory, researchers highlighted factors other than the technology's features that influenced the perception of the richness of the medium. These factors are as follows: exchange of social information, in which, over time leaner media became as effective as richer media (Walther, 1995); familiarity with communication partners (e.g. Carlson & Zmud, 1999), established norms, and relationships among group members (McGrath et al., 1993).

Factors other than a technology's features are more evident when the same technology is used in the same company. In this regard, Webster (1998) found that the desktop videoconferencing system was used less than its functions allowed and that employees have different levels of use. Webster explained this difference by reference to the following factors: social influence, medium experience, job fit, desktop video self-efficacy and lower introversion.

### **Videoconferencing Effects on Learning**

Similar results are found in the field of education and training. For example, some researchers found that learning mediated by videoconferencing lead to a higher degree of interaction with the teacher, linked to more efficient learning (Goodfellow, 1996) and to a higher degree of collaboration between learners (Marquet, 2003; Rutter, 1987; Sellen, 1995) than face-to-face learning.

However, other researchers have shown mixed results. O'Conaill et al. (2003) showed that the interaction between the learners and the trainers was more like a face-to-face interaction in a leaner videoconferencing system than in a richer videoconferencing system.

Alavi et al. (1995) found that the three environments (face-to-face collaborative learning, local groups – students on the local campus – and non-proximate distant groups involved in Desktop Videoconferencing (DVC) were equally effective in terms of student knowledge acquisition. However, higher critical-thinking skills were found in the distant DVC environment. The students in the three environments were equally satisfied with their learning process and outcomes. The distant students using DVC were more committed and attracted to their groups compared to local students who worked face-to-face or through DVC.

Comparing audioconferencing and desktop videoconferencing, Yoo & Alavi (2001) found that the influence of group cohesion (members' attraction to the group) over social presence is additive, rather than substitutive, to that of media condition.

Similarly, other authors considered that videoconferencing is « neutral » and the type of videoconferencing does not affect levels of use. (Clark, 1994; Collins, 1995).

Furthermore, the way videoconferencing is implemented is highly important. Ologeanu (2005) and Webster & Hackley (1997) suggested that the greater number of locations, the greater the process losses and the less involved the remote students appeared.

### **Research Framework**

The acceptance of IT in a particular domain of training has not been a prevalent topic for researchers. Researchers have focused on the effectiveness of learning using IT (Technology-Mediated Learning, Web based virtual learning environments, group support systems, Desktop videoconferencing) and on users' satisfaction or performance. Nevertheless, learning effectiveness is one aspect of the use and the implementation of an IT.

The perceptions, attitudes and behaviors of the end-users are also important, especially for perceived learning effectiveness, for learners' intention to use the IT for learning, and for the adoption of these new tools. These become even more important in skills training, in companies where employees may support or not support a technology-mediated learning environment.

In this paper, we consider users' satisfaction with and acceptance of a videoconferencing tool. We also explore users' behaviors and attitudes using appropriation theory.

### **Technology acceptance**

This study tests several relationships based on the Unified Theory of Acceptance and Use of Technology (UTAUT), (Venkatesh et al., 2003). According to this theory, an individual's behavior is conditioned by his/her intention to adopt a technology, and this depends on two variables: perceived usefulness and perceived ease of use.

Segars & Grover (1993) developed a measure of usefulness that consists of six indicators: enables the individual to work more quickly, makes a job easier, useful, increases productivity, effectiveness, and effect on job performance. Davis (1989) defined perceived usefulness as the extent to which the object of adoption is thought to enhance the individual's performance on the job.

Segars & Grover (1993) identified four perceived ease of use indicators: easy to use, easy to learn, easy to become skillful, clear (understandable). Davis defined perceived ease of use as the degree to which a person believes that using a particular system would be free from effort (Davis, 1989).

The concepts of usefulness and ease of use are related to the task and to the technology. They may be linked to Task-Technology Fit Theory, according to which IT is more likely to have a positive impact on individual performance and to be used if the capabilities of the IT match the tasks the user must perform (Goodhue & Thompson, 1995). Goodhue & Thompson

(1995) suggest 8 factors to measure the task-technology fit: quality, locatability, authorization, compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users.

Taking into account the population and the specific domain of our study, we defined perceived usefulness as follows:

- The degree to which learners think that videoconferencing can facilitate their timetable management by decreasing travelling for skills training. According to this meaning, the notion of instrumental use and the notion of perceived usefulness are synonymous.

- The degree to which learners think that using videoconferencing brings an additional interest in training, that videoconferencing for training is more efficient than face-to-face training, and that interactions with the trainer are better than in face-to-face training.

We define the perceived ease of use by the perceived quality of the videoconferencing tool and by the perceived quality of training through videoconferencing.

We do not measure training effectiveness, but learners' satisfaction with training through videoconferencing.

In line with UTAUT theory and the definitions of perceived usefulness and perceived ease of use, six dimensions were measured as follows:

Figure 1. *Dimensions and Definitions*

Dimension	Definition (item)
Previous IT experience	Previous knowledge and experience of IT and distance training.
Personal Motivation	<p>The pleasure and the self-esteem derived from the use of videoconferencing for training or from using an innovative tool.</p> <p>The increase in integration into the group they belong to (family, friends, colleagues) or the increase in prestige that coincides with videoconferencing use.</p>
Perceived usefulness	<p>Usefulness for training</p> <p>The extent to which using videoconferencing increases the effectiveness of training and timetable management</p> <p>Usefulness for training management</p> <p>The extent to which using videoconferencing enhances the effectiveness of performed work by reducing travel time and increasing timetable management.</p>
Task-Technology fit	The extent to which videoconferencing matches training tasks in the company
Perceived ease of use	The degree to which using videoconferencing for training is free from effort such as technical or educational skills required and the lack of interaction, notably with the trainer.
Satisfaction	The degree to which videoconferencing is evaluated on several dimensions: Sound Quality, Picture Quality, Quality of Slides legibility, Conditions for speaking, Interaction with the trainer, Interaction with peers.

Intention to use	Intention to use videoconferencing sessions, after these experiments.
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### **Appropriation of information technologies**

Appropriation is one of the main concepts of Adaptive Structuration Theory (AST), which considers that technologies are manipulated and structured by users in their contexts (DeSanctis & Poole, 1994). DeSanctis & Poole (1994) make a distinction between the spirit and the features of a technology. Spirit is defined as “the official line that the technology presents to people regarding how to act when using the system, how to interpret its features, and how to fill in gaps in procedure which are not explicitly specified.” (p. 126). Features are characteristics or technical functions of the technology.

According to DeSanctis & Poole (1994), there are four aspects of appropriation:

- Appropriation moves,
- Faithfulness of appropriation (which means that appropriation may be faithful or unfaithful to the IT spirit),
- Instrumental uses, which are intended purposes that groups assign to technology as they use it (for example, task activities),
- Attitudes that the group displays as technology structures are appropriated. Thus, the definition of appropriation includes acceptance aspects (linked to the users’ attitudes toward the IT). The appropriation dimension of “instrumental uses” is very close to the idea of “perceived usefulness”.

However, the concept of appropriation is focused on uses during IT implementation while the concept of acceptance highlights users’ perceptions, particularly before the IT implementation (Baillette & Kimble, 2008). Appropriations are defined by DeSanctis and

Poole (1994) as “immediate, visible actions that evidence deeper structurations” (p.128).

Thus, appropriations are synonymous with adaptations (Majchrzak et al., 2000). New technologies represent opportunities to change groups’ structures.

We focus on appropriations such as uses and changes of group structures. We suggest that in the specific domain of training, group structures may be described like “pedagogical genres”. We note the interactions based on “best practices”, that is a pedagogical genre according to Fallery (2005). Pedagogical genres are communication genres in the special situation of training (Yates & Orlikowski, 1992). Pedagogical genres are characterized by the pedagogical intention (what to teach?) and by the pedagogical method (how to teach?). There are various pedagogical genres such as Courses, Talks, Examples, Demonstrations, Debates, Simulations, etc.

In our study, pedagogical genres may be shaped by the trainer (who designs the learning process) or by the users. In the first case, pedagogical genres describe technology’s spirit, while in the second case they describe appropriation moves (changes of group structures).

In this work, we decided not to study appropriation moves for three reasons. First, videotraining was not yet fully implemented and, at the experimental stage, the videoconferencing tool is quite flexible. Secondly, the distant class and the remote class are two different systems with different structural features. Finally, in the experimental situation, the trainer can shape the system (to choose different functions) and, thus, change structural features and the technology’s spirit.

In the particular domain of training, we must consider the possible effects of pedagogical and technical distances (Marquet & Nissen, 2003). The pedagogical distance focuses on the interactions and exchanges between peers and between learners and trainer.

We measured the pedagogical distance using Lickert’s attitudes scale with the following items: “In the videoconferencing environment, discussions were easier with the trainer than in

face-to-face training”, “In the videoconferencing environment, the group’s atmosphere was better than in face-to-face”, “In the videoconferencing environment, I dared more easily ask a question of the trainer than in face-to-face training”, “In the videoconferencing environment, I felt more isolated than in face-to-face training”, “In the videoconferencing environment, I was more relaxed than in face-to-face training.”

Technical distance is produced by technical mediation (such as breakdowns or cuts in transmission).

We can link pedagogical and technical distance with satisfaction with the videoconferencing (sound, video and transmission quality). For example, the quality of transmission might be low whereas learners could report that this is not a problem for the success of the training and that they were satisfied with this quality level.

## **Methodology**

### **Context**

The company that we studied has around 170,000 employees, spread across the whole country. Skills training is provided in different locations and employees have to travel to participate in training sessions on specific topics. Each year, several thousands hours are provided by 1500 trainers.

Managers wanted to explore learners’ and trainer’s perceptions, attitudes and uses of two types of training through videoconferencing: the virtual class and the remote class.

In the virtual class, the learners and their teacher were situated in several locations and interacted through their personal computers and specific videoconferencing software. In the remote class, learners were gathered together in the same room and only the trainer was situated at distance. In both classes, learners could “interact” with the teacher (ask questions, request explanations, and make comments): everyone could see each other and all could participate in the training.

### **Participants**

The experiment had to fit in with the company's usual training practices.

A total of 60 learners participated in the experiment. 19 one-hour videoconferencing sessions of training (7 sessions in virtual classes involving 20 students and 10 sessions in remote classes involving 40 students) were carried out. The number of participants per session varied. There were 2, 3 or 4 learners for each virtual class session and between 3 and 6 participants for each remote class session.

The topic of these sessions was to provide professional skills for employees operating in the commercial domain. The learners had been chosen by their line managers according to the same criteria used for the « traditional » training in the company. For all the sessions, the same trainer was involved in the experiment. During the sessions he used different tools (DVD and PowerPoint presentation) and interacted with the learners.

From reasons such as availability of the network and of technical skills, the training sessions were provided in the same building. The distance was simulated both for the virtual class and for the remote class. The trainer was located in a different room of the same building but the learners were informed that he was elsewhere. In both situations, learners were situated in the same room. In the virtual class, they were isolated from each other because they used their personal computers to interact with each other and with the trainer. The learners changed at every session.

### **Measurement issues**

In order to measure all the variables, we used two methods:

- Qualitative methods: focus group interviews with learners, based on an interview guide, and observation of the video conferencing sessions. The purpose of this method was to measure appropriation moves,

- Quantitative methods, consisting of a survey. A questionnaire combining 41 open and closed questions was administered immediately after each session. The closed questions were designed according to the five-point Likert scales.

Analyses of all measures were conducted using Sphinx for Windows. We combined Chi-square tests to measure relationships between answers to closed questions, and lexical analysis to treat the open answers and the focus group interviews.

Content analysis was employed to study observation accounts. We created a coding frame, based on the pedagogical genres.

We have to point out that the sample's limited size allows us only to make some propositions for future research.

### **Findings**

We have formulated the findings of this study into several statements.

1. Satisfaction with the virtual class is higher than satisfaction with the remote class.

a) Learners in virtual classes reported higher satisfaction and higher levels of intention to continue using videoconferencing than learners in remote classes.

85.7% of the learners in virtual classes reported satisfaction while 68.3% of the remote class learners reported satisfaction. 100% of the virtual class learners reported an intention to continue using videoconferencing for training, while 60% of learners in remote classes reported this intention.

b) Learners in virtual classes reported significantly higher satisfaction with the videoconferencing-mediated training than learners in the remote classes.

This result is derived from the Chi-square test, correlating types of environments of videoconferencing for training (Virtual/Remote) and several aspects of the satisfaction variable.

The results of Chi-square test are as follows in Table 2.

*Table 2. Satisfaction: Differences Between Virtual class and Remote class*

Type of relationship	Significance
Sound quality x Type of environment	Significant ( $X^2 = 2.73$ , $1-p = 90.15\%$ )
Video quality x Type of environment	Significant ( $X^2 = 2.28$ , $1-p = 86.90\%$ )
Slides legibility quality x Type of environment	Not significant
Conditions for speaking x Type of environment	Significant ( $X^2=5.27$ , $1-p = 97.83\%$ )
Interaction with the trainer x Type of environment	Significant ( $X^2 = 3.67$ , $1-p = 94.47\%$ )
Interactions with peers x Type of environment	Highly significant ( $X^2 = 6.83$ , $1-p = 99.10\%$ )

2. Learners in virtual classes reported significantly higher perceived usefulness than learners in remote classes.

This result is derived from the Chi-square tests correlating types of videoconferencing environments for training (Virtual/Remote) and several aspects of the perceived usefulness variable (Table 3).

Table 3. Perceived Usefulness: Differences Between Virtual Class and Remote Class

Perceived usefulness	Relationship
Training through videoconferencing contributes to decrease in professional training travelling in the future x Type of environment	Highly significant ( $X^2 = 2.83$ , $1-p = 90.75\%$ )
Training through videoconferencing is more efficient than face-to-face training x Type of environment	Significant ( $X^2 = 3.07$ , $1-p = 92.04\%$ )
Training through videoconferencing brings an additional interest to training compared to face-to-face training x Type of environment	Highly significant ( $X^2 = 4.16$ , $1-p = 95.85\%$ )
Interactions with peers are more frequent in training through videoconferencing than in face-to-face training x Type of environment	Highly significant ( $X^2 = 6.83$ , $1-p = 99.10\%$ )
Training through videoconferencing is adequate for skills training in the company x Type of environment	Significant relationship ( $X^2 = 5.30$ , $1-p = 97.87\%$ )

3. Learners reported high motivation for real operational gains.

This result is based on lexical analysis of responses to two open questions (Table 4).

*Table 4. Operational gains: sample of lexical analysis*

Question	Occurrence of the most-commonly used words
According to you, what are the main interests in training via video conferencing?	Time (13), No Travel (21), Gain (7).
What are the advantages in videotraining for you?	Time (5), Teacher (6), Gain (4), No travel (7)

4. The learners' satisfaction factors are as follows: their previous IT experience, their personal motivation and their interest in innovation. We summarise this result in the Table 5.

*Table 5. Factors of Satisfaction*

<b>Satisfaction correlated with...</b>	<b>Relationship</b>
Previous IT experience	Significant ( $X^2 = 4.45$ , $1-p = 96.50\%$ )
Personal motivation	Significant ( $X^2 = 8.09$ , $1-p = 98.25\%$ )
Interest in innovation	Highly significant ( $X^2 = 17.45$ , $1-p = >99.99\%$ )

This Chi-square analysis was complemented by lexical analysis of answers to two open questions. The first question was: “*If you are satisfied with the experience, what are your reasons?*” The occurrences of each of the most commonly used words in the responses are as follows: new (12), trainer (8), interactivity (4), topic (4), pleasant (4). We provide here a sample of texts containing the words frequently quoted (Table 6).

*Table 6. Factors of satisfaction: sample of lexical analysis.*

Innovation interaction – trainer
Innovative and fun
Innovative and practical
Innovative and playful
Innovative – create a new atmosphere
Newness
New technologies

A second question was: *“If you are in favour of training through videoconferencing, what are your reasons?”*

The occurrences of each of the most commonly used words in the responses are as follows: new (17), discover (7), technology (11). We provide in Table 7 a sample of texts containing the words frequently quoted (Table 7).

*Table 7. Reasons To Be in Favour of Videoconferencing: Sample of Lexical Analysis.*

New
I love to use new technologies
Discover another method of training
Using new technologies – innovative training
We have to learn with a new technology
Discovery – technology
New technology
New – allow training closer to the workplace
Use of new technologies – training equivalent to face-to-face training
New – use other communication technology
Adopt new - technologies
Discovery - new
Find out if this technology can be useful for learning – find the limits of this technology
Discovery of new tools
Discovery of the method
Why not discover new methods
Use new technologies
Interested in new ideas for skills training
Using it
Newness
Discover the tool
Pay more attention to training

5. The behavioral intention is linked to the expected benefits (perceived usefulness), but not to the expected effort required.

The number of answers to the questionnaire did not allow us to test using a structural equation model. Consequently, we only tested, one-by-one, each relation of the UTAUT model envisaged by the Chi-square calculations. We found a significant relationship between the task-technology fit and the learners' satisfaction ( $X^2=14.59$ ,  $1-p = 97.63\%$ ) and between the learners' satisfaction and the intention to continue use of videoconferencing for training ( $X^2=21.37$ ,  $1-p=98.89\%$ ).

We also found a significant relationship between the perceived expected benefits (perceived usefulness) and the intention to continue using videoconferencing for training ( $X^2= 10.7$ ,  $1-p=98.89\%$ ). In contrast, the relationship between the expected effort (which is the opposite to ease of use) and the intention to continue using videoconferencing for training is not significant.

6. The trainer prefers to control interactivity and interactions, whereas learners prefer interactions between peers, notably "best practice" interactions.

The previous results are related to the acceptance of videoconferencing for professional training. The following results concern learners' appropriation of videoconferencing.

The teacher preferred to manage interactivity whereas learners preferred discussions between participants, notably "best practice" exchanges. We may say that the teacher preferred a specific pedagogical genre (transmissive courses) while learners preferred a different one (exchanges between peers). In the virtual class, learners did not discuss and interact with each other spontaneously while in the remote class they tended to discuss amongst themselves best practices in their day-to-day tasks and to exclude teacher from the debate. For this reason, the teacher reported a preference for the virtual class, which did not allow the discussions between learners that a face-to-face class would.

We may consider that pedagogical genres described both a technology's spirit and groups' structures. According to this definition, learners' appropriation (they share "best practices") was not faithful to the technology's spirit (trainer controls and initiates all interactions with and between the learners).

This result raises an additional question about the purpose of the training: learners reported their need to exchange ideas on the best practices, which is not a topic provided in the training system of the company.

7. The higher the level of satisfaction with videoconferencing for training, the less the pedagogical distance was felt (both the distance between peers and the distance between learners and the trainer).

This result is based on the Chi-square test correlations between learners' satisfaction with videoconferencing for training and pedagogical proximity (which is the opposite of pedagogical distance). The relationship between these variables is significant ( $\chi^2=3.57$ ,  $1-p = 94.12\%$ ).

8. Learners did not report a technological distance, although this distance did exist.

This result is produced from technological distance evaluations by the learners, and from our observations. Thus, we observed several problems as follows: in virtual classes, the remote learners hearing their own voice coming back at them; a howling created by feedback or a strong reverberation. Both in virtual and in remote classes, we observed that the bandwidth fluctuated during the videoconferencing session, that introduced sound delay, video blackouts or image flickers. At least once we observed a breakdown of the videoconferencing system. Nevertheless, these failures did not interfere with the learners' attention or involvement. Learners coped with these technical problems and they reported a high level of satisfaction with the technical features.

In a certain way, this result contradicts richness media theory and confirms other findings related to the perceived richness of a media (Carlson & Zmud, 1999; McGrath et al., 1993; Walther, 1995).

### **Discussion and Limitations**

Our results have theoretical, methodological and practical implications.

Regarding theoretical implications, the main result of our study is that learners in virtual classes reported higher levels of satisfaction and greater intention to continue using videoconferencing than learners in remote classes. This result contradicts media richness theory according to which “rich” media (defined by their ability to change understanding within a time interval – Daft & Lengel, 1986, p. 560) are generally more effective and more suitable for ambiguous and uncertain tasks than “lean” media. In our study, the rich medium is the remote class (which allows interactions between learners similar to face-to-face training) and the lean medium is the virtual class.

How do we explain this result? We may link it with the other results: one factor of satisfaction for learners is their interest in innovation, also learners in virtual classes reported significantly higher perceived usefulness than learners in the remote classes. The virtual class offers more operational gains (decrease in travel, possibility to learn on the workplace) and it appears more innovative. It is possible that learners consider virtual classes as being an original situation that they don't compare to face-to-face training; in contrast with the remote class, that is at the same time more like and more different from face-to-face learning. This would mean that learners' perception of rich media is different from the “objective” richness of media in the theory. This hypothesis must be verified by further research. It would be interesting to deepen our research and test another theory: the Uses and Gratification

Expectancy Theory for the e-learning, according to which e-learning resources offer gratifications that are expected and valued by students. (Mondi et al., 2007).

Nevertheless, our finding is similar to the mixed outcomes about the influence of IT on learning performance or learning satisfaction (Alavi et al., 2002; Benbunan-Fich & Hiltz, 2003; Mehlenbacher et al., 2000; Piccoli et al., 2001; Russell, 1999).

The methodological implication of our study is related to the fact that it is very important to explore learners' and trainers' perceptions, attitudes and uses before the implementation of a new information technology within an organization. The experimental use of an IT is a key stage of the innovation process. Furthermore, several kinds of ITs (different videoconferencing situations, different types of collaborative software,...) have to be compared and tried in order to choose the tool which may best fit the task, taking into account the features and IT's spirit.

Regarding practical implications, we pointed out that the intention to use is linked to the expected benefits, the motivations and to the appropriateness with the situation, rather than with the effort to be made. These findings contradicted managers' expected results. At the beginning of our study, managers thought that employees would reject IT and would report a resistance to change by focusing on obstacles and effort required to make use of videoconferencing for training. Moreover, it does not seem effective to focus on the barriers, even if they do exist (anxiety about the required technical and educational skills, worries related to technical breakdowns, about fatigue or isolation...). On the contrary, managers could try to promote « incentives » for this kind of training (supplementary interest, effectiveness, pleasure, new educational content...).

Furthermore, our observations showed that learners were able to cope with technological difficulties. The gap between the technical distance and the acceptable quality level of the videoconferencing tool suggests that company managers do not need to invest a lot of money

in buying expensive videoconferencing systems that provide higher quality. If barriers to videoconferencing implementation exist, they are not related to the technical quality of the system.

Last but not least, learners reported a preference for interactivity between peers, whereas the trainer reported a preference for controlling all interactions with and between the learners. For this reason, managers have to ensure that the purposes of the training programmes meet the employees' training needs.

### **Conclusion**

Our study explored acceptance and appropriation of two videoconferencing systems for training: virtual videoconferencing and remote videoconferencing. We examined employees' perceptions, attitudes and behaviors during real training sessions. One of our findings is that satisfaction with the virtual class is greater than satisfaction with the remote class. This result contradicts media richness theory. We may explain it by reference to learners' expectations because they reported significantly higher perceived usefulness in virtual classes than did learners in remote classes. Moreover, all learners reported motivation for real operational gain (such as no travelling needed for participation in training sessions).

The behavioral intention is linked to the expected benefits (the operational gains), but not to the expected efforts to be made. The higher the level of satisfaction with videoconferencing, the less the pedagogical distance was felt (both the distance between peers and the distance between the learners and the trainer). Learners did not report a technological distance, although this distance did exist. For these reasons, we aim to deepen our research and explore the Uses and Gratification Expectancy Theory for the e-learning.

Another result is that the trainer preferred to control interactivity and interactions whereas learners preferred interactions between peers, notably "best practice" interactions. Managers may need to take account of this demand from employees.

We suggest that the evaluation of an IT trial has to combine concepts of the acceptance theory with the concepts of studies related to IT appropriation and further research is needed on these topics.

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