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# **Videotraining: A comparison between “virtual class” and “remote class”**

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## **Abstract**

The main question in this article is to evaluate a new type of communication technology, the videoconferencing as a tool for remote training. The usage of two tools of videotraining is observed: the usage of individual computer in “virtual class” and a usage of a “remote class”. In the first part, a review of the literature will enable us to present the questions specific to the evaluation of video conferencing use within the framework of a training course. In the perspective of use we may consider two type of founding models: the model based of acceptance and the model base on requirements.

The second part describes the methodology and the protocol for the videotraining experiment in a true situation, set up within the framework of a research contract with a large company which enabled us to closely monitor nineteen sessions of videotraining. The third part presents the results in terms of use mostly from the students’ point of view and also from teacher opinion.

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## **Keywords**

e-learning, distance-learning, videotraining, intraining systems, Video conference, Information and communication technologies (ICTs) evaluation, ICTs uses, remote training.

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The main question in this article is to evaluate a new type of communication technology, the videoconferencing as a tool for remote training. The usage of two tools of videotraining is observed: the usage of individual computer in “virtual class” and a usage of a “remote class”.

In the first part, a review of the literature will enable us to present the questions specific to the evaluation of video conferencing use within the framework of a training course. In the perspective of use we may consider two type of founding models: the model based of acceptation and the model base on requirements.

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## **KEYWORDS**

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## 0. INTRODUCTION

The development of the Internet and personal information systems has introduced new possibilities in the field of training, notably for remote training. In this context, videoconferencing appears to be a promising technical device, as it enables us to cross distances whilst conserving possibilities of real time interaction between teachers and trainees. It is therefore important to analyse the first uses of “videotraining”.

In the first part, a review of the literature will enable us to present the questions specific to the evaluation of video conferencing use within the framework of a training course. In the perspective of use we may consider two type of founding models: the model based of acceptance and the model base on requirements.

The second part will describe the methodology and experimental protocols for videotraining in a true situation which we set up within the framework of a research contract with a large French company. Among the several questions ask by the contractor this article will focus on the comparison of the use between two solutions of video training: virtual class and remote class.

The third part explains our results concerning the comparison between the perception of virtual class and remote class. Implications are drawn for future research on videotraining.

## 1. BACKGROUD

Our research question lies at the intersection between three areas: communication via particular medium, e-Training and evaluating Information systems.

### 1.1 Communication and videoconferencing.

Research on the use and adoption of videoconferencing in French organisations

[1,2,3] has brought to light the emergence of multiple uses, via an organisational learning process through utilisation projects with specific aims for a community of users.

The uses observed, which correspond to ad hoc technical configurations, fall into two categories:

- “Videomeetings” for operational or strategic coordination or project-monitoring in the automobile, aeronautics, telecommunications, and electronic sectors.
- “Videotraining” sessions or “video conferences” in the fields of information technology, telecommunications and banking.

Some of these projects, to the astonishment of their initiators, have led to very little or no use, which would considerably hinder the development of subsequent projects. Research on the reasons for this failure or success has brought to light varying factors:

- Socio-technical factors such as problems with malfunctioning equipment in a « live » remote communication situation and a true situation with the use of equipment by non-specialists, or such as « network effects » incidences, for an emerging communication technology [2],
- Socio-organisational factors (lack of accompaniment and co-ordination between remote sites),
- Socio-economic factors (few benefits perceived compared with those expected, both from the point of view of the organisers and users).

Besides, according to research carried out at the beginning of the nineties [1] the success of a video conference depends on the type of communication situation. Videoconferencing would appear to be better suited, at least at the beginning of its emerging phase of uses, to certain types of communication situation.

These communication situations have been characterised by their degree of complexity and incertitude, estimated from criteria such as: the point of the communication

situation (more or less structured, requiring greater or lesser intensity of exchange), the participants (a greater or lesser number, forming more or less homogeneous groups), and the modalities for organisation of the session (a more or less scattered group, impromptu sessions or, inversely, planned and successive).

Research carried out led us to the conclusion that, at least at the beginning of its use, videoconferencing seemed to be better-suited to sessions whose degree of complexity and incertitude was not too high such, as successive sessions, between two distant sites, involving homogeneous groups of participants.

Besides this, when there is a specific necessity, such as an emergency or the student's impossibility to travel, this is also a determining factor for use.

The proposition to experiment on videotraining for a large company, whose research is the object of this present article, was notably based on results of previous research: identification of an experimentation project in a true situation with an ad hoc technical configuration test, in the context of progressive organisational learning processes involving technical and organisational accompaniment and an evaluation of the experiment.

## **1.2 Communication, Videoconferencing and e-Training**

Training via videoconferencing, or videotraining, has given rise to few experiments and to even fewer studies being published. Why is this? Probably because, for some authors, videoconferencing cannot claim to be known as an e-Training tool since it does not make it possible to deliver knowledge in the absence of a teacher, at any time and any place, according to the classical definition of remote training [4,5].

And yet training via videoconferencing has given rise to a few experiments since the nineteen eighties, notably in companies and

[1] further education. In spite of the evolution in technical media, however, (videoconferencing by satellite, by specialised links, via the ISDN network (Integrated Services Digital Network) and Internet today, it has not managed to go beyond the experimental stage and lead onto more generalised use [6].

The result of studies on videotraining currently published thus seems to be that the technical configuration retained crystallises one or the other of these aims:

- When the equipment is chosen to meet specific educational requirements it is generally interactivity which is brought to the fore [6], by limiting the number of video conference sites to two or three, as well as the number of learners on each site (fewer than 20 people per site).
- If, however, it is the criteria for financial cost reduction which predominate, the equipment will privilege video conferences with more than 5 or 10 sites, with large numbers of participants, which will obviously reduce the possibilities of interaction between learners and also between the teacher and learners.

In these conditions, it was therefore important for our study in a true situation in a company to clearly distinguish two configurations: what we called the remote class (learners meeting together in one room, with a remote teacher) and the virtual class (learners, separated on their individual computer set and a remote teacher).

## **1.3 Evaluation of the Videotraining system.**

The theoretical debate on the evaluation of a Videotraining System falls into the general debate on information systems evaluation [7, 8]. Beyond that, it is also part of the greater debate on the use of ICTs. The word "use" refers just as much to an utilisation ("*to have the use of a sum of money*")

as to a group of appropriate rules (“this expression has come into use”).

In the first idea of use, that of utilisation, we may consider two types of founding model: models based on acceptance and models based on requirements.

- The models based on acceptance use the TAM (Technology Acceptance Model) [9, 10]. The behaviour of an individual is conditioned by his/her intention to adopt, and this depends on two variables, *perceived* utility and the *perceived facility of use*. Venkatesh, with the unified theory of acceptance and the utilisation of the technology (UTAUT), also brought out the importance of *social influence* and a certain number of *moderating variables*, which would apparently explain 70% of the variance in the intentions of use [11].
- The models based on requirements mainly refer to work by Delone and Mc Lean [12] and then on work by Seddon [13] considering that the dimension *system quality* may affect the use and satisfaction, and work by Goodhue and Thompson [14] places importance on the *appropriateness between task and technology* to explain performance.

All of these “use” models form part of the perspective that we call technological imperatives, according to which ICTs appear to be an external force which determines the behaviour of individuals in view of individual or organisational performance. In the field of e-Training in particular, a way of applying these models has already been suggested [15].

For our work on the evaluation of videotraining, and partly assuming this first perspective, we proceeded with a combination and a restriction of acceptance and requirements models, in our quantitative study retaining most particularly the four most validated relationships in the literature: the fi-

nal performance is linked to task appropriateness and the behavioural intention, which itself depends on the advantages hoped for and expected efforts.

## 2. PROJECT

### 2.1. Context of the videotraining experiment in a true situation.

Although videotraining has already been established in a few companies, there are not many of them and their use has never been the subject of scientific evaluation. This evaluation is precisely the aim of our study, in a true professional training situation, carried out in a large company.

In this particular company, with around 170,000 employees, spread across the whole country, the stakes are high for internal professional training with several millions hours given by the equivalent of about 1 500 full time teachers.

The educational methods tend to be orientated towards active pedagogy in order to improve motivation, so that skills can be acquired in the true situation and meet the training requirements in the context of rapidly-changing jobs and recruitment of new employees. The training sessions are generally for small groups of about ten participants.

This is why videoconferencing was chosen, as it allows remote bi-directional communication of sound and animated pictures. Also, with this medium, distances can be crossed whilst conserving « live » real time exchanges between teachers and learners.

### 2.2. Aims of the research: Comparison between the two types of Videotraining class

However the use of videoconferencing for company training is, for the moment, at the

experimental stage (even though videoconferencing is often used for meetings). This is why it is important, during this emerging phase of application, to analyse the first uses in order to confirm whether or not there really are potential advantages and to estimate the limits or risks.

For the videotraining sessions, various educational configurations are possible depending on the number and type of remote classroom: amphitheatre, classroom, individual terminals...

The current trends regarding educational methods for internal professional training favour active pedagogy based on exchanges between participants and teachers.

This is why the aim of the solutions retained was to give priority to interactivity and live exchanges, for small groups of learners (and not in an amphitheatre) with the possibility of participants speaking easily, with visualisation of the teacher by the learners and visualisation of the learners by the teacher or by the other remote learners.

Two technical and educational configurations were retained for this experiment:

- The « remote class » : the learners are gathered together in the same room and the teacher is situated at distance ;
- The « virtual class »: the learners and their teacher are situated at a distance, separated by their individual workstations, each one linked to the others via his computer screen, with headphones and a microphone. With the device retained training sessions could be carried out with 5 distant learners maximum.

In all cases, the learners could “interact” with the teacher (ask questions, request explanations, and make comments): everyone could see each other and all could participate.

The aim of the research project was to evaluate the perceptions of learners and teachers towards videotraining, in both remote and virtual classes.

### **2.3. Experimental conditions in a true training situation.**

The experiment was intended to fit into the company’s usual training practices and was submitted to restrictions linked to the setting up of a true situation within the organisation.

19 two-hour videotraining sessions were carried out (7 in a virtual class and 10 in a remote class), involving a total of 60 learners. The theme for these sessions was internal training of an operational nature. These learners had been chosen according to the same criteria as for the « traditional » training carried out in the company.

From the point of view of availability of premises, connections and availability of a network, the training sessions all took place in the same building. The distance was thus simulated, with the teacher in one room and the learners in another. Due to this experimental simulation of the distance, it is probable that the effects of the distance were made lesser, notably the effects in socio-technical terms (functioning of the network and technical support) and in organisational terms

### **2.3. Analysis and data-processing**

For the questionnaire analysis, five dimensions inspired by different acceptance models were constructed. These five dimensions were constructed from several answers:

*Table 1: The selected dimensions*

Dimensions	Questions
expected benefits	Supplementary interest of Videotraining, more efficient than training in presence of the teacher, follow videotraining with pleasure, Enjoyed the training session, Enjoyed following this training course, rewarding educational content, more direct discussion, Group atmosphere
Expected required efforts	Teacher's technical skills, learners' technical skills, teachers educational skills, Problem with communication tools, worry about technical breakdowns, + isolated, +tiring, informal contacts with the teacher
Task-Technology appropriateness	Appropriateness of Contents, Appropriateness of personal restrictions, Appropriateness of restrictions for certain categories.
Intention to use	Envisage videoconferencing in the future by going to a place closer to my home, going further in the use of videoconferencing for training sessions, curious to discover videoconferencing, appreciate following this innovative training, technology is an absolute necessity for training.
Satisfaction	Training evaluation, sound quality, interactive quality, document legibility, Quality of exchanges with the teacher, speaking conditions

The data obtained from issuing the 56 questionnaires were analysed using Sphinx-Lexica data-processing software: 14 questionnaires for the virtual class, 42 questionnaires for the remote class. The 8 questionnaires for the “teacher present” class could not give rise to a statistical-type analysis.

Three types of processing were carried out:

- Simple analyses in percentages, question-by-question. Here we will only give details of the most important results. What we call “dimension” is a fusion between several questions: for example the “motivation after the experiment” is a fusion between four questions “Following this videotraining course was a real pleasure ; I enjoyed the session ; I enjoyed following this training session ; I would envisage videoconferencing in future”
- Research analyses about relationships, cross-sorted with a first dimension (*for example remote class/virtual class*)

with a second dimension (*for example: strong/weak motivation after the experiment*). As the questions were not digital, we did not use the correlation coefficient here but the “Chi-squared test”. All the apparently interesting relationships were tested (if Chi-squared is not significant, nothing can be confirmed regarding the presence or absence of a relationship). “Lexical” analyses used by respondents for the open questions (those for which a comment was required). The frequency of lexical words and their proximity helped to bring out what “what being spoken about”.

### 3. RESULTS

Following the analysis of quantitative data via the questionnaire and qualitative data via direct observation and de-briefing interviews, we may now present the comparative results on virtual and remote class use (evaluated before and after the training sessions).

The performance of the « virtual class » configuration is judged to be stronger than that of the “remote class” configuration.

This is an original result, as it would appear to be wrong according to certain conjectures which might have been drawn from the theory of richness of media : a transmission which was *a priori* more difficult in the Virtual class configuration did not have the negative effects predicted. This result is derived from the Chi-squared test in crosses between types of configuration (Virtual/Distant) and several dimensions of the performance variable: the perceived interest, the reduction in travel, discussions with the teacher, the efficacy of training, as well as several technical dimensions.

To better qualify this validated relationship, each space in the chart below indicates the force of attraction (+) or rejection (-) between modalities (it is the contribution of



each space to the relationship: percentage chi2 of the space/ total chi2).

- a) There is a strong relationship between the type of class being followed (virtual/remote) and the perceived interest for videotraining. Dependence is very significant (chi2 = 10.37, ddl = 1, 1-p = 99.87%).
- b) The interest for reduction in travel is stronger for the virtual class. The variable “Motivation for work organisation” consists of the following variables here 'will avoid having to travel' and 'Envisage videoconferencing.' Here the dependence is significant (chi2 = 2.83, ddl = 1, 1-p = 90.75%).
- c) The relationship is established between the type of configuration and the evaluation of discussions with the teacher, data in answer to the following question: “In videotraining, were the discussions with the teacher more direct than for training sessions when he was present in the classroom”? Dependence is fairly significant (chi2 = 4.48, ddl = 2, 1-p = 89.36%).
- d) A difference is established between the type of Class and the answer to the question: “This videotraining course seems to me to have been more effective than training with the teacher present”. The dependence is significant here (chi2 = 3.07, ddl = 1, 1-p = 92.04%).

supplementary interest?				
Do you will avoid having to travel and envisage videoconferencing?	-4	+14	+20	<u>-62</u>
Are discussions more direct?	-8	<u>+27</u>	+15	<u>-47</u>
More efficient than with teacher present?	-16	+9	<u>+47</u>	<u>-28</u>

- e) We are not going to go over all the Chi2 charts here, but the difference is established with the virtual class winning between the type de Class and the answers to the questions: “Do you think videotraining has made a particularly valuable contribution to this training course?” and “In a videoconference, I was more attentive than when the teacher was present in the classroom”.
- f) In the same way, the difference is established with the virtual class as the winner between the type of Class and the perception of technical Quality: for interactivity, the dependence is very significant, it is significant for speaking conditions, fairly significant for sound and pictures.
- g) To have the teacher point of view we have realized teachers’ interview. It appears that he prefers clearly to manage a virtual class than a remote class. He thinks that he better control the virtual class situation. Moreover, during the observation of the different sessions, the teacher succeeded in maintaining the student exchanges between them.

**Table 2: The Chi2 partial / Chi2 total chart**

Chart showing Chi2 partials/Chi2 total	Remote class		Virtual class	
	agree	disagree	agree	disagree
Does videotraining have a	+16	-9	<u>-48</u>	+27

#### 4. FUTURE TRENDS AND CONCLUSIONS

Beyond this first step of experimentation the contractor is interested in having a new step of experimentation. The purpose will

be the trial of the virtual class for the staff training because further experiments and research are needed to study the virtual class training efficacy.

The main question in this article is how to evaluate this communication technology, videoconferencing, used for remote training.

Due the restricted amount of specific research on this type information technology, the theories on ITCs evaluation, in general, have been mobilised by joining together two complementary perspectives; the perspective of acceptability and requirement models.

Even, if further research are planned to complete that results, however, by closely following nineteen videotraining sessions we were able to highlight the following result: contrary to expectations, a preference for the virtual class set-up rather than the more classical remote class solution. This preference illustrates a form of technology "bypass".

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