

## TECHNOLOGY ACCEPTANCE AND SOCIAL PRESENCE IN DISTANCE EDUCATION – A CASE STUDY ON THE USE OF TELECONFERENCE AT A POSTGRADUATE COURSE OF THE HELLENIC OPEN UNIVERSITY

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### Abstract

This paper examines specific technological and pedagogical parameters in relation to teleconference, namely the “perceived ease of use”, the “perceived usefulness”, the “social presence” and the “intention to use”. A case study was conducted involving postgraduate students from a modular course of the School of Humanities of the Hellenic Open University. Based on this study, the preconditions for the efficient use of teleconference as an inclusive educational tool are also discussed. The results of the study suggest that a main condition for the successful educational use of teleconference is the familiarization with the technology (teleconference platform), so that it can be used with autonomy and ease. Furthermore, the more useful students believe that teleconference is for their studies, the greater is their intent to participate in teleconference meetings. Social presence, which is strongly correlated with the perceived ease of use and the perceived usefulness of teleconference, is considered very important for developing an appropriate educational environment and for increasing the satisfaction of students from a teleconference meeting. To enable, however, a widespread use of these tools and to avoid any exclusion of students, specific elements and conditions should be taken into account.

**Keywords:** distance education; teleconference; Technology Acceptance Model; perceived usefulness; perceived ease of use; social presence; intention to use.

### Introduction

The rapidly developing Information and Communication Technologies (ICT) enhance learning in all disciplines and are becoming increasingly popular among students and teachers in distance and conventional education. The availability of ICT has opened the way of enhancing teaching and learning in distance education using both synchronous and asynchronous tools. Despite the practical advantages of asynchronous learning tools, the extensive development and application of synchronous learning environments has become a major challenge. Teleconference is one of the main advanced ICT applications used for educational purposes. The term “teleconference” in this study refers to the meeting among two or more participants which allows them to interact via two-way video and audio transmissions simultaneously as well as to exchange data in real time via the internet (Negash et al., 2008). Research on the educational use of audio conference and teleconference at the 1980’s aimed mainly at its technical characteristics; however, the need for a pedagogically integrated approach was already established from the first stages (Rothe, 1985).

Since the 1990's, emphasis has been shifted to the pedagogical issues for the use of teleconference in education, while in the previous decade emphasis was also placed on the assessment of the educational use of teleconference for the benefit of future users and researchers in the field (e.g. Anderson & Garrison, 1995; Robson, 1996; Rovai, Ponton & Baker, 2008). In Greece, teleconference is only recently used as an educational tool, initially in post-secondary education, and to a smaller extent in primary and secondary education, through pilot applications and projects linking educational institutions. Anastasiades (2008) edited a collection of research papers on the use of teleconference for educational applications in Greece, while Vavouraki (2005) examined the prospects of deploying videoconference in secondary education of four European countries, including Greece. Finally, Hadzilacos, Papadakis and Rossiou (2007) and Xenos, Tsiatsios and Vassiliadis (2008) presented their experiences from the pilot use of teleconference as an educational tool in computer science related courses of the Hellenic Open University (HOU). However, specific concepts related to distance education, such as acceptance of technology, use of technology and social presence have not been investigated in this context.

One of the main parameters related to the deployment of ICT tools is the acceptance of technology from its users (which in the case of education are students as well as teachers). Since the mid-1970's several models were developed in order to explain the behaviour of technology users regarding the acceptance and use of technological means. One of the most widely applied models is the Technology Acceptance Model (TAM), which was introduced by Davis at the end of the 1980's (Davis, 1989; Davis, Bagozzi & Warshaw, 1989). The main pillars of this model are the "perceived usefulness" and the "perceived ease of use" of technology. Davis relates usefulness to the reliance that the use of a technological application will increase the performance of the user and ease of use to the reliance that the use of a technological application will not be related to increased effort. In TAM, the intention to use a technological system or application is usually the dependent variable of the model. TAM is the most commonly used model to examine the acceptance, adoption and use of advanced ICT applications in education (e.g. Liaw, 2008; Ngai, Poon & Chan, 2007; Pituch & Lee, 2006; Selim, 2007; Ma & Liu, 2004). Johnson, Hornik and Salas (2008) examined the parameters influencing the development of a successful e-learning environment, looking at the technological characteristics of TAM together with other parameters which are very important in an educational context, such as interactivity and social presence.

Social presence, first described by Short, Williams and Christie (1976), is a very important component of the educational process and can be used together with technological parameters, such as those described by TAM, to provide a more comprehensive evaluation of the effectiveness of ICT tools in distance education. Several researchers support that, if communication is facilitated so that the perception of social presence is increased, this can improve the effectiveness of distant education using ICT tools. In this case it can be used alternatively with face-to-face educational methods, achieving similar results (e.g. Gunawardena & Zittle, 1997; Richardson & Swan, 2003). Gunawardena and Zittle (1997) formulated a set of indicators for social presence, which were then used by other researchers (Kreijns, Kirschner, Jochems & van Buuren, 2004) to develop tools for measuring social presence. Several researchers manifest the importance of social presence for learning and for achieving student satisfaction (e.g. Hratsinski, 2009; Richardson & Swan, 2003; Tu, 2002). Tu and McIsaac (2002) supported that social presence has a crucial effect for internet communication, both qualitatively and quantitatively.

This paper presents and discusses a case study on the use of teleconference at the Hellenic Open University (HOU) which is the main pillar for the introduction of distance education methodologies and tools in Greece. Teleconference is a relatively novel educational tool for HOU. It should be noted that although technological and pedagogical aspects of teleconference

have attracted different levels of attention at different types of distance education institutions and courses (in relation to the use of ICT tools), research into the relationship between perceived usefulness and social presence and intention to use is both of interest and value across a broad spectrum of distance education providers. In the present case, both pedagogical and technological aspects should carefully be examined as the academic population is not limited to that linked to computer science courses. In this respect, the parameters of “perceived ease of use”, “perceived usefulness”, “social presence” and “intention to use” are examined, using as a case study the modular course on “Open and Distant Education” of the School of Humanities of the HOU.

## **Methodology**

### ***The framework***

The HOU was officially established in 1997 (Law 2552) and is the only University offering exclusively distance education courses in Greece. It consists of four (4) Schools: Humanities, Social Sciences, Science and Technology, and Applied Arts. It currently offers six (6) undergraduate and twenty five (25) postgraduate courses, all addressed to adult learners, with a total of 203 course modules (<http://www.eap.gr>). The number of registered postgraduate and undergraduate students in 2012 was approximately 31000, while the tutor-to-student ratio was approximately 1/20. For each course module, HOU students should hand in 4-6 written assignments throughout the 10-month academic year and a compulsory sit exam at the end of it. Furthermore, each course module includes five face-to-face Counselling Group Sessions (CGS) which take place in 9 cities all over the country. Participation in CGS is not compulsory.

Tutor-student communication and interaction between CGS is mainly held through e-mail and telephone. Students at HOU are provided with a variety of learning materials: especially adapted printed course material and a set of books, audio and video material, CD-ROMs/software, all specially prepared for distance learning. Students must plan their own time to study the course material, to work on the course activities, and to hand in assignments by the due date. There is also a web-based instructional environment / portal (<http://online.eap.gr>), where each course has its own website. Course websites simplify organizational procedures and provide fora for asynchronous interaction (<http://www.eap.gr>). The use of the portal is gradually increasing.

One of the most challenging issues discussed in relation to the studies offered by the HOU is the development and use of ICT tools in pedagogical practices (Kostourakis, Panagiotakopoulos & Vergidis, 2008). Koustourakis et al. (2008) suggest that the HOU lags behind many other open and distance education institutions in the world, specifically in terms of incorporating and using ICT to support students in their learning. Other recent studies suggest that ICT tools, such as teleconference, are already deployed – initially at a pilot scale – in the School of Science and Technology and especially in modules related to Computer Science (Hadzilacos et al., 2007; Xenos et al., 2008). However, teleconference tools are not used at the School of Humanities of HOU.

### ***Research questions***

The case study described in this paper concerns the design and implementation of a teleconference meeting involving the teachers and postgraduate students of three groups of the module “Open and Distance Education” of the School of Humanities of the HOU. The teleconference meeting was the means used as a communication and learning tool, while the

research questions focus on specific parameters of distance learning, both technological (i.e. perceived usefulness and perceived ease of use) or social-pedagogical (i.e. social presence). This combined investigation of technical and social-pedagogical parameters is very important for the effectiveness of distance education programs and is the subject of ongoing research.

The research questions were:

1. What was the “perceived ease of use” of teleconferencing for students and how it changed after a) the initial presentation of the teleconference tool and its capabilities (Presentation Teleconference), and b) after their active participation into a teleconference meeting?
2. What was the “perceived usefulness” of teleconferencing for students and how it changed after a) the Presentation Teleconference, and b) after their active participation into a teleconference?
3. What were the students’ perceptions for “social presence” in a teleconference and how these changed after their active participation in a teleconference?
4. What are the perceptions and attitudes of students for the future use of teleconference at HOU courses?

### ***Preparation and Implementation of the teleconference meeting***

The teleconference platform used for the purpose of this study was Centra Symposium platform, provided by the Saba Company. The platform enables large groups of learners who may be at different locations to interact, cooperate and learn in real time – by following procedures similar those of a real class – with the help of local networks and the Internet. Central role to the effective use of Centra Symposium has the coordinator (leader), who regulates the basic parameters of the process. The platform Centra, apart from the features of audio, video, slide show, whiteboard, and chat communication, offers a number of different possibilities, including Live Interactive Learning Tools (such as feedback, floor control, application sharing breakout Rooms and labs, multiple presenters, peer-to-peer interaction, evaluations, quizzes and surveys).

During the present case study, postgraduate students from three groups of the course module “Open and Distance Education” participated initially at a teleconference which was held at the third CGS meeting. The main purpose of this teleconference (Presentation Teleconference) was to familiarize students with the teleconference tool. All students were located in an amphitheatre and were connected through a virtual classroom with the ICT department of the HOU. A laptop connected with a data projector was used in order to enable all participating students to reach the presenter. The teleconference consisted of a lecture describing the features and the services offered by the platform, followed by a “questions and answers” session where individual students had the opportunity to ask questions and clarifications. The Presentation Teleconference was recorded and sent to all students in order to be able to watch it again if they needed.

Following the familiarization of students with the teleconference tool, an actual teleconference meeting (Educational Teleconference Session – ETS) took place, where individual students participated through their own computer. This teleconference was conducted between the third and fourth CGS meetings of the course module, which were also the CGS meetings separated by the largest time interval. Analytical instructions for the necessary equipment (web camera, microphone and speakers), the client software set-up procedure and the required browser settings were sent by e-mail to all students in time before the ETS. Finally, a helpdesk was also established which was used by four students. Many features of the teleconference tool were used during the ETS, such as audio/microphone and video communication, PowerPoint presentation, whiteboard, breakout groups and online questionnaire/survey. The subject of this teleconference

was related to the evaluation of the 3<sup>rd</sup> written assignment, a subject that was considered particularly interesting for the students. The ETS was also recorded in order for students and tutors to be able to watch it again anytime they needed.

### **Data collection and analysis methods**

Data collection was based on two questionnaires; one printed and one on-line. The printed questionnaire was used during the presentation teleconference (*Presentation questionnaire*) and was answered by 50 individuals. It consisted of two parts: part A was filled in by each student before the presentation and part B after the presentation. Both parts included fixed choice questions (with ordinal and nominal answers) and open-ended questions. Following a few demographic questions, the questionnaire asked students about their experience with computers, internet and synchronous teleconference systems, their perceptions about the “perceived ease of use”, the “perceived usefulness”, the “social presence” and the “intention to use” teleconference. The presentation questionnaire included two open-ended questions asking for recommendations (a) in order to improve the quality / effectiveness of the teaching - learning process through teleconference and (b) in order to inform HOU how to exploit ICT in a better way. The open first question was answered by 22 individuals and the second by 14.

The on-line questionnaire was distributed to the students after the ETS meeting (*Teleconference questionnaire*) and was answered by all participants (29 individuals). It consisted of fixed choice questions (with ordinal and nominal answers) concerning the perceptions of students about the “perceived ease of use”, the “perceived usefulness, the “social presence” and the “intention to use” teleconference (The two questionnaires are presented in the Appendices A and B of this paper).

For all the ordinal fixed choice questions, a five-point Likert scale was used while content analysis was performed to categorize students’ answers to the open-ended questions. The data collected were analyzed mainly by descriptive statistics (frequencies, means and SD). Comparisons among the parameters’ values at each stage of the study (before the presentation teleconference, after the presentation teleconference and at the end of the educational teleconference) were examined using Wilcoxon test,  $\chi^2$  test, Mann-Whitney test and Kruskal-Wallis test. Correlations between the different parameters of the questionnaires were examined using the correlation coefficient of Spearman ( $r_s$ ). The statistical package SPSS 10 was used to perform the statistical analysis and the level of significance for the statistical tests was set at 0.05.

### **Validity and reliability**

The content validity refers to *what* the questionnaire measures and *how well* it does so. Thus, it is built into a questionnaire from the outset through the choice of appropriate items (questions) (Anastasi & Urbina, 1997). In order to ensure the validity of the questionnaires used in this study:

1. the questionnaires were constructed based on the approach and research tools used by other researchers examining similar research questions related to the same technological and pedagogical parameters published in open literature (e.g. Cyr, Hassanein, Head & Ivanov, 2007; Ong, Lai & Wang, 2004; Liaw, 2002; Ngai et al., 2007; Pituch & Lee, 2006; Ma & Liu, 2004; Johnson et al., 2008; Gunawardena & Zittle, 1997; Kreijns et al., 2004; Sun, Tsai, Finger, Chen & Yeh, 2008), and
2. the questionnaires were examined by four specialists in distance education, and their comments were taken into account to ensure the clarity and completeness of the

questions. Furthermore, the analysis of the results showed that the Spearman correlation coefficient provided reasonable correlations between the examined parameters, a fact that supports the validity of the questionnaires.

The concept of reliability in its broadest sense indicates the extent to which individual differences in answers are attributable to ‘true’ differences of the characteristics under consideration and the extent to which they are attributable to chance errors. Cronbach’s  $\alpha$  reliability coefficient was used in this study to measure the internal consistency of the questionnaires. Cronbach’s  $\alpha$  for the presentation questionnaire and the teleconference questionnaire were  $\alpha=0.9304$  and  $\alpha=0.9670$  respectively, which are both high and statistically significant ( $p<0.001$ ), indicating that the questionnaires can be considered reliable and internally consistent.

## Sample description

The returned sample for the *presentation questionnaire* consisted from 24 men (48 %) and 26 women (52 %). Their majority was aged between 25 and 34 years (27 students, a percentage of 54 %). All the students of the sample held a graduate degree while 5 held already a post-graduate degree. They all had a computer (at their home, work or at both), while their majority (70 %) used the computer on a daily basis and the email service on a weekly basis. The use of the computer is a pleasant activity for the majority of the students (about 70 % answered “quite”, “much” or “very much” in the relevant question), while about 90 % noted that they feel no stress or anxiety when using computers. Less than 5 % stated that they know “nothing” about teleconference, while approximately 45 % reported that they know “much” or “very much” about it. The great majority (98 %) stated that they use internet systematically, 44 % stated that they have used a microphone connected to a computer and the same percentage reported that they have used a web camera. Finally, 52 % have already used software for synchronous communication (for example Skype, MSN Messenger, Lotus Sametime, Centra).

As noted above, the returned sample of the *teleconference questionnaire* consisted of 29 individuals from the sample of the *presentation questionnaire* who participated voluntarily at the teleconference meeting. Since this was an online questionnaire, the results were provided through Centra platform as the frequencies per answer and therefore data were not as explicit and did not allow inductive statistics. As most of the questions of the *teleconference questionnaire* were identical with questions of the *presentation questionnaire* and the remaining questions were very similar, comparisons between the two questionnaires could be conducted.

## Results

### **Presentation Questionnaire**

In this section the results from the fixed choice questions are presented, while the content analysis of the responses to the open-ended questions is incorporated at the discussion subsection, for reasons of economy. The “perceived usefulness” of teleconference was examined before and after the presentation of the teleconference tool (Table 1). Students’ perceptions for the usefulness of the teleconference were positive both before and after the presentation, while the differences between the answers to the sub-questions before and after the presentation were not statistically significant (Wilcoxon test,  $p> 0.05$ ). Students supported that teleconference would make studies more interesting, would improve their communication with the teacher, would help them to solve questions and to exchange ideas or discuss with other students. They

do not really think that teleconference would improve their academic performance, help them study more effectively or help them fulfil their assignments.

Table 1: Mean scores per question concerning Perceived Usefulness before and after the Presentation and Z and p values of the Wilcoxon test

Perceived Usefulness	Mean (before PTC)	Mean (after PTC)	Z, p
PU1	4.14	4.21	-0.97, >0.05
PU2	4.06	3.98	-0.99, >0.05
PU3	4.04*	4.04*	0.00, >0.05
PU4	3.52	3.68	-1.75, >0.05
PU5	3.82	3.90	-0.48, >0.05
PU6	3.54	3.67	-1.18, >0.05
PU7	3.57	3.63	-1.04, >0.05
PU8	4.16	4.10	-0.47, >0.05
PU9	4.00	3.92	-1.16, >0.05
PU10	4.10	4.08	-0.24, >0.05
PU11	4.18	4.08	-1.23, >0.05
PU12	3.94	3.96	0.00, >0.05
PU13	3.96	3.92	-0.37, >0.05
PU14	4.00	3.98	-0.26, >0.05
PU15	4.08	3.96	-1.51, >0.05
PU16	3.78	3.73	-0.50, >0.05
<b>Total Mean</b>	<b>3.93</b>	<b>3.93</b>	

\*scores for question PU3 have been inversed to be comparable to those for other questions.

The “perceived ease of use” of teleconference was also examined before and after the presentation of the teleconference tool (Table 2). Students’ perceptions for the ease of use of the teleconference were in general positive, but less positive in comparison with their perceptions for the usefulness of the teleconference. Differences between the answers to the sub-questions before and after the presentation were not statistically significant (Wilcoxon test,  $p > 0.05$ ). The majority of the students answered, both before and after the presentation, that it would be easier to solve questions via teleconference and that it would be easier to provide explanations regarding the educational material. Furthermore, before the presentation, students answered that teleconference is not tiresome, while after the presentation the majority of them stated that such a procedure could make easier the exchange of ideas and the discussions with other students. The lower mean scores, both before and after the presentation, were observed for the questions regarding if teleconference is technically easy and if it is easy to have the platform do what they really want it to do.

Table 2: Mean scores per question concerning Perceived Ease to Use before and after the Presentation and Z and p values of the Wilcoxon test

Perceived Ease of Use	Mean (before PTC)	Mean (after PTC)	Z, p
PEU1	3.06	2.88	-1.37, >0.05
PEU2	3.34	3.29	-0.56, >0.05
PEU3	3.51	3.33	-1.26, >0.05
PEU4	3.55	3.48	-0.58, >0.05
PEU5	3.08	3.28	-1.19, >0.05
PEU6	3.6	3.56	-0.44, >0.05
PEU7	3.76*	3.6*	-1.33, >0.05
PEU8	2.98	2.94	-0.16, >0.05
PEU9	3.57*	3.46*	-1.04, >0.05
PEU10	3.31	3.31	-0.12, >0.05
PEU11	3.44	3.29	-1.31, >0.05
PEU12	3.54	3.44	-1.02, >0.05
PEU13	3.62	3.52	-0.93, >0.05
PEU14	3.6	3.65	-0.08, >0.05
PEU15	3.72	3.77	-0.36, >0.05
PEU16	3.62	3.75	-0.96, >0.05
PEU17	3.48	3.6	-0.86, >0.05
PEU18	3.58	3.58	-0.06, >0.05
PEU19	3.78	3.81	-0.37, >0.05
PEU20	3.36	3.23	-1.23, >0.05
<b>Total Mean</b>	<b>3.48</b>	<b>3.44</b>	

\* scores for questions PEU7 and PEU9 have been inversed to be comparable to those for other questions.

The perception of “social presence” was examined only after the presentation of the teleconference tool (Table 3). Students’ perceptions of social presence during the teleconference meeting were positive. The results showed that the majority of students believe that teleconference would offer them the opportunity to have an active role in the educational procedure and would be a pleasant way to communicate with other students and the teacher. Furthermore, it would create an enabling environment for interpersonal communication and, mainly, it would contribute to the development of an online learning community. However, they believe that teleconference is a more impersonal means of communication as compared to face-to-face communication.



Table 3: Mean scores per question concerning Social Presence after the Presentation

<b>Social Presence</b>	<b>Mean (after PTC)</b>
SP1	3.83
SP2	3.57
SP3	3.68
SP4	3.4
SP5	3.74
SP6	3.85
SP7	3.19*
SP8	2.68*
SP9	3.74*
SP10	3.66*
SP11	3.87
SP12	3.62
SP13	3.47
SP14	3.13
SP15	3.62
SP16	3.6
SP17	3.74
SP18	4.02
<b>Total Mean</b>	<b>3.58</b>

\* scores for questions SP7 to SP10 have been inversed to be comparable to those for other questions

The intention to use teleconference was examined only after the presentation of the teleconference tool (Table 4). The students suggested that they would like to participate in an educational teleconference, that teleconference should be used as a tool by the HOU and that teleconference is a promising educational tool.

Table 4: Mean scores per question concerning Intention to Use after the Presentation

<b>Intention to Use</b>	<b>Mean (after PTC)</b>
IU1	4.21
IU2	3.92
IU3	4.25
IU4	3.96
IU5	4.06
IU6	4.17*
IU7	4.35
<b>Total Mean</b>	<b>4.13</b>

\* scores for question IU6 have been inversed to be comparable to those for other questions

Statistically significant and strong correlations were observed a) between the “perceived usefulness” and the feeling of “social presence” after the presentation ( $r_s = 0.717$ ,  $p < 0.001$ ) and b) between the “perceived ease of use” and the feeling of “social presence” after the presentation ( $r_s = 0.601$ ,  $p < 0.001$ ). These correlations show the inherent relation of the perceived ease of use and the perceived usefulness, after the presentation of the teleconference tool which created a common basis of understanding, with social presence. Statistically significant but not strong correlations characterize the relation of perceived usefulness ( $r_s = 0.434$ ,  $p < 0.01$ ), perceived ease

of use ( $r_s = 0.338$ ,  $p < 0.05$ ) and social presence ( $r_s = 0.573$ ,  $p < 0.001$ ) with the intension to use teleconference in the future.

## Teleconference Questionnaire

The results of teleconference questionnaire are shown in Table 5.

Table 5: Mean scores and Standard Deviation per Question for the Teleconference Questionnaire

Question	PU.I	PU.II	PEU.I	PEU.II	SP.I	SP.II	IU.I	IU.II
Mean	3.86	3.83	3.66	3.90	4.07	2.07*	4.31	4.38
S.D.	0.79	0.80	1.01	0.82	0.53	1.10	0.66	0.82

\* scores for question SP.II have been inversed to be comparable to those for other questions

Students' perceptions for the various parameters were positive with the highest mean scores observed for the intention to use teleconference in the future.

## Comparison between the two questionnaires

Comparisons between the answers of the presentation questionnaire before and after the presentation can be easily performed since the questions are identical. Each student provided his/her responses on the same questionnaire sheet, enabling the paired comparisons of his/her responses before and after the presentation. On the other hand, as the presentation and teleconference questionnaires are not entirely identical, their comparison is more difficult. However, such a comparison is valid as the two samples have similar characteristics and the questions of the teleconference questionnaire are either identical with specific questions of the presentation questionnaire or can be paired with questions examining the same parameters. When data existed for the three stages (before the presentation, after the presentation, at the end of the teleconference), the Kruskal-Wallis ( $\chi^2$ ) test was used, while when data were available for two stages (after the presentation and at the end of teleconference) the Mann-Whitney (U) test was used (Table 6).

Table 6: Question Number and Mean scores per question for the Presentation Questionnaire (before and after) and the Teleconference Questionnaire as well as U and p values of Mann-Whitney test and  $\chi^2$  and p values of Kruskal-Wallis test

Presentation Questionnaire			Teleconference questionnaire		U	$\chi^2$	p
Question	Mean (before)	Mean (after)	Question	Mean			
PU5	3.82	3.90	PU.I	3.86	-	0.761	>0.05
PU6	3.54	3.67	PU.I	3.86	-	3.438	>0.05
PU7	3.57	3.63	PU.II	3.83	-	1.237	>0.05
PEU1	3.06	2.88	PEU.I	3.66	-	10.604	<0.01
PEU2	3.34	3.29	PEU.II	3.90	-	8.197	<0.05
SP5	-	3.74	SP.I	4.07	526.5	-	≤0.05
SP8	-	3.32	SP.II	2.07	320.5	-	<0.001
SP9	-	2.26	SP.II	2.07	574.5	-	>0.05
SP10	-	2.34	SP.II	2.07	537.5	-	>0.05
SP11	-	3.87	SP.II	3.93*	586.5	-	>0.05
IU1	-	4.21	IU.I	4.31	632.5	-	>0.05
IU2	-	3.92	IU.I	4.31	523.5	-	<0.05
IU5	-	4.06	IU.I	4.31	581.5	-	>0.05
IU3	-	4.25	IU.II	4.38	560.0	-	0.092

\* scores for question SP.II have been inversed to be comparable to those for other questions.

The results showed that after participating at the teleconference, students felt more strongly that they belong to a learning community, according to the mean values and the Mann-Whitney test (Table 6). Furthermore, they thought of teleconference as less impersonal than before participating and they expressed a stronger intention to participate again in a teleconference meeting. The Kruskal-Wallis test showed that although after the presentation there was a slightly more negative perception regarding the ease of use, after their participation in the teleconference meeting they believed that the preparation and the participation in a teleconference is technically easy and the teleconference platform is user-friendly (Table 6).

## Discussion

### *Perceived usefulness*

Perceived usefulness was positive from the initial stage and remained such. Parameters such as the pleasure or stress related to the use of a computer, the knowledge about what teleconference is, as well as the experience in using software for synchronous communication do not affect students' perceptions. This is in agreement with previous studies which suggest that this type of parameters may affect only the perceived ease of use (van Raij & Schepers, 2008). According to many researchers, there is a statistically significant relation between "perceived ease of use" and "perceived usefulness" (Ma & Liu, 2004; Saade & Bahli, 2005; Yi, Jackson, Park & Probst, 2006; Landry, Griffeth & Hartman, 2006; Castaneda, Munoz-Leiva & Luque, 2007; Teo, 2009) and this is also the case in this study. The positive perceptions remain after the participation in the ETS meeting (Table 6). Only six answers to the first open-ended question (and none to the second) were related to the perceived usefulness. Answers showed a general positive attitude towards the usefulness of teleconference. Furthermore, some of the answers made obvious the necessity for

the teleconferences to be strongly related with specific educational issues such as practice, question solving and bibliography searching.

### ***Perceived ease of use***

The perceived ease of use was the main concern of those who answered the open-ended questions. Out of the 22 answers to the first question, 18 referred to issues related to the perceived ease of use, while 13 answers included reference only to the perceived ease of use. Regarding the second question, 9 answers focused only on the perceived ease of use. Most answers to both questions focused on the need to inform and prepare students regarding the capabilities and the way to use the teleconference tool. Another topic on which answers focused was technical issues, including mainly recommendations on how the HOU could improve the ease of use of the teleconference tool and exploit the use of ICT in general. Some answers indicated the anxiety / fear that a small number of students still have towards these technologies.

The results of the fixed-type questions showed that the students initially had a positive perception regarding the ease of use of the teleconference. Their attitude towards the perceived ease of use remained the same after the presentation, during which their active participation was very limited. Parameters such as the pleasure or stress related to the use of a computer, their knowledge about teleconference as well as their experience in using software for synchronous communication, affect their perceptions. This is in accordance with previous studies supporting that stress directly affects students' satisfaction from an e-learning course (Ong et al., 2004; Sun et al., 2008). The correlation between stress and the perceived ease of use clearly indicates the necessity of an initial presentation of the teleconference tool to decrease the stress involved in using it.

Differences between men and women suggest that perceived usefulness is more important for men, while perceived ease of use is more important for women, which is in accordance with other studies (Brosnan, 1998; Huber & Scofield, 1998; Koch, Muller & Sieverding, 2008; Cyr et al., 2007). Comparisons of the different parameters between the three stages of the study showed the importance of the familiarization of students with the procedure and teleconference tools, in order to develop a positive perception regarding the ease of use. At the end of the ETS meeting they believed that the preparation for as well as the participation in a teleconference is technically easy and the tool used is friendly. The results of Lau and Woods (2009) also suggest that the perceived ease of use is changing with time via the familiarization with the tool. Analytical / step-by-step instructions, technical support and the use of a helpdesk have an important impact on the perceived ease of use (Liaw, 2002; Teo, 2009; Ngai et al., 2007). An advantage of the proposed scheme for joining an on-line meeting from a remote location is that the students do not need to have expensive equipment and advanced knowledge in ICT for participating in the virtual classroom.

### ***Social presence***

The perception of social presence is also positive. Parameters such as the pleasure of using a computer and the knowledge about what teleconference is, affect students' perceptions. There is a strong relationship between perceived usefulness and social presence, as well as between perceived ease of use and social presence after the presentation teleconference, as Cyr et al. (2007) also observed. Therefore, the more positive their perception for the ease of use and the usefulness is, the higher their sense of active participation and social presence becomes. According to several researchers, female students pay strong attention to the feeling of social presence during on-line courses (Richardson & Swan, 2003; Baskin & Henderson, 2005). Social presence and the feeling of belonging in a learning community are stronger at the end of the

teleconference meeting, as the answers to the on-line teleconference questionnaire showed. Mason (1998) supports that teleconference facilitates the development of a climate of ‘familiarity’ and ‘personal openness’ and that its most important contribution to open and distance learning is in the development of a learning community. Anderson and Garrison (1995) also agree, but they point out that the use of teleconference tools alone does not lead to the development of a learning community. According to Tu (2002), technological, pedagogical and cultural parameters affect the feeling of social presence. Collaborative activities seem to enhance this feeling. Garrison (2011) highlights the role of social presence in online distance learning as an essential construct in a collaborative constructive approach to learning.

### ***Intention to use***

Most answers to both open questions showed, usually indirectly, the positive attitude of the students towards the future use of teleconference in their studies and discussed the requirements that should be fulfilled in order to improve the educational use of teleconference. In the first question there are 6 direct answers to the intention to use teleconference in the future, all showing a positive attitude and focusing on the need for a more frequent use of teleconference. In the second question there were 4 direct answers showing a positive intention ICT to be used by HOU. Regarding the fixed-type questions, the intention to use teleconference was high at all stages, showing the students’ willingness to use such tools during their studies. Parameters such as the pleasure of using a computer and the knowledge about what teleconference is, also affect their perceptions. There are strong relationships between “perceived usefulness”, “perceived ease of use”, “social presence” and “intention to use” teleconference in the future, especially at the end of the ETS meeting. Results of other studies agree with this finding (Hu, Clark & Ma, 2003; Yi et al., 2006; Liaw, 2008). Therefore, the higher the perceived usefulness and the perceived satisfaction is, the higher the intention to use teleconference in the future becomes.

Researchers such as Legris, Ingham and Collete (2003) support that in order for the TAM model to be improved, social and organizational factors should be taken into consideration. The results of the present study show very clearly this inherent relation between the technological and social-pedagogical parameters. Such parameters are very important in order to promote active participation in an on-line environment. As Hrastinski (2009) suggests, participation in a learning procedure is a complex activity where a student learns conducting relationships with others.

### **Conclusions**

Teleconference is only recently being used in Greece as an advanced ICT application in education, initially in post-secondary education, and in a smaller extent in primary and secondary education, through pilot applications and projects linking educational institutions. A case study is presented in this paper focusing on specific parameters related to technological and pedagogical aspects of teleconference, such as the “perceived ease of use”, the “perceived usefulness”, the “social presence” and the “intention to use”, focusing on students of the module on “Open and Distant Education” of the School of Humanities of the HOU. The examination of such parameters is very important for the successful and effective implementation of distance education, especially in the educational environment of Greece where open and distance learning has only recently started to grow and where research on its most important features is of special interest.

According to the results of the present study, students' perceptions for the usefulness of the teleconference were positive as they believed that teleconference would make their studies more interesting, would improve their communication with the teacher and would help them to answer questions and exchange ideas or discuss with other students. Their perceptions for the ease of use of the teleconference were also positive in general, but less positive in comparison with their perceptions for the usefulness of the teleconference. Students' perceptions of social presence during the teleconference meeting were also positive, with mean scores higher than the mean scores for the perceived ease of use and lower than the mean scores for the perceived usefulness. The majority of students think that teleconference would offer them the opportunity to have an active role in the educational procedure and would be a pleasant way to communicate with other students and the teacher. Most of the students suggested that they would like to participate in educational teleconferences in the future as they found it a promising educational tool.

Strong correlations were observed between the feeling of social presence and the perceived ease of use and perceived usefulness after the familiarization of students with the teleconference tool, since the perceived ease of use is changing with time via the familiarization with the tool (Lau & Woods, 2009). In this respect, analytical / step-by-step instructions, technical support, use of a helpdesk and demonstration/pilot teleconferences would have an important impact on the perceived ease of use and, consequently, on the effectiveness of the teleconference tool. The results show that as the teleconference tools are improving, the appropriate conditions are developing for their use at the School of Humanities of the Hellenic Open University. To enable, however, a widespread and pedagogically efficient use of these tools, parameters such as the ones examined here should be considered. In this respect, software selection, standardisation and distribution should take into account the needs of students and the computational resources available to them and should ensure that the technological means can be easily used by all students, so that teleconference meetings can focus on the pedagogical aspects for which they are used.

Further research could focus on the role the tutors in a teleconference environment and on their training needs. Furthermore, similar studies with students from different disciplines as well as from undergraduate courses would enhance the outcomes of this study and assist in developing an enabling environment for the effective implementation of ICT means such as teleconference in an educational framework where the use of distance education and educational technologies has only recently started to spread.

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## **APPENDIX A. Presentation Questionnaire Items**

### **a. Perceived usefulness**

*I believe that:*

PU1: Participating in a teleconference will make my studies more interesting

PU2: Teleconference will increase the students' interest for participation

PU3: Preparing and conducting a teleconference is a waste of “educational” time

PU4: Teleconference will improve my academic performance

PU5: Teleconference will contribute to the formation of a high quality learning environment

PU6: Teleconference will help me study more effectively

PU7: Teleconference will improve the quality of my written assignments

PU8: Teleconference will improve communication with my tutor

PU9: Teleconference will improve communication with my fellow students

PU10: Teleconference is useful for solving questions

PU11: Teleconference is useful for discussion and exchange of ideas

PU12: Teleconference is useful for promoting collaboration between students

PU13: Teleconference is useful for the support and encouragement of students by the tutor

PU14: Teleconference is useful for discussing the preparation for written assignments and final exams

PU15: Teleconference is useful for providing clarifications regarding the educational material

PU16: Teleconference is useful for the elaboration of group educational activities

### **b. Perceived ease of use**

*I believe that:*

PEU1: Conducting a teleconference is technically easy

PEU2: Teleconference platforms are user-friendly

PEU3: It is easy for me to remember how to perform tasks using the teleconference platform

PEU4: The teleconference environment (platform) is flexible

PEU5: How to use a teleconference platform is clear and understandable

PEU6: It is easy to acquire the technical skills to use a teleconference platform

PEU7: Teleconference is tiresome / cumbersome

PEU8: It is easy to get the teleconference platform to do what I want it to do

PEU9: Using a teleconference platform requires a lot of mental effort

PEU10: It is easy for the students to get what they want from a teleconference

PEU11: It is easy to communicate with my fellow students through teleconference

PEU12: It is easy to communicate with my tutor through teleconference

PEU13: Conversation is easy through teleconference

PEU14: Visual contact (through video) is easy through teleconference

PEU15: Solving questions is easy through teleconference

PEU16: Discussion and exchange of ideas is easy through teleconference

PEU17: Collaboration between students is easy through teleconference

PEU18: Discussing the preparation for written assignments and final exams is easy through teleconference

PEU19: Providing clarifications regarding the educational material is easy through teleconference

PEU20: Elaboration of group educational activities is easy through teleconference

### **c. Social presence**

*I believe that:*

SP1: Teleconference will give me the opportunity to actively participate in the educational process

SP2: Teleconference will give me the feeling of “human contact”

SP3: Teleconference is a good means for social interaction

SP4: I will feel at ease to take the floor and present myself in a teleconference

SP5: Participating/taking the floor in a teleconference will give me the feeling of belonging to a learning community

SP6: Teleconference is an engaging way to communicate with my fellow students and my tutor

SP7: Interaction with a teleconference environment (platform) is often disappointing

SP8: Teleconference is a more impersonal means of communication as compared to face-to-face communication

SP9: Teleconference is a more impersonal means of communication as compared to e-mail communication

SP10: Teleconference is a more impersonal means of communication as compared to telephone communication

SP11: Teleconference will contribute to the creation of a climate of interpersonal communication within the module

SP12: I will feel at ease to participate in a teleconference

SP13: It will be easy to express what I want and what I feel during a teleconference

SP14: The place from where I will join a teleconference (e.g. home, office) will not affect my attitude to participation

SP15: Teleconference will help me develop social relations with the other participants

SP16: I will actively participate in the discussion during a teleconference

SP17: Teleconference will provide the opportunity for support and encouragement of students by the tutor

SP18: The co-ordinator of a teleconference can contribute to the development of the sense of an internet learning community

#### **d. Intention to use**

IU1: I would like to participate in a teleconference, if I have the opportunity during my studies at the HOU

IU2: I will aim at participating at a teleconference at any opportunity during my studies

IU3: The exploitation of teleconference by the HOU is a very good idea

IU4: I will recommend the use of educational teleconference to anyone I know that participates in educational processes

IU5: I would like to participate in a teleconference, if I had the appropriate technical means

IU6: I believe that teleconference does not worth the time and effort required

IU7: I believe that tele-education / teleconference has prospects as a learning tool

**APPENDIX B. Teleconference Questionnaire Items**

**a. Perceived usefulness**

PU.I: I believe that teleconference is useful because it enables me to learn

PU.II: I believe that teleconference will improve the quality of my written assignments

**b. Perceived ease of use**

PEU.I: I believe that preparation and participation in a teleconference is technically easy

PEU.II: I believe that the Centra teleconference platform is user-friendly

**c. Social presence**

SP.I: I believe that teleconference gives me the feeling of belonging to a learning community

SP.II: I believe that teleconference is an impersonal way of communication

**d. Intention to use**

IU.I: I would like to participate again in a teleconference

IU.II: Teleconference should be widely used by the HOU