

# Evaluating the Effectiveness of an e-Learning System: an Exploratory Study

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## **Abstract**

The efficiency of an e-learning system is determined by a good interaction between the IT systems, teaching materials, professors, and students. Analysing the users' perceptions can provide valuable data to evaluate and improve its functioning and performance. Based on the analysis of primary data collected from students involved in it, the paper presents and discusses, in the specific context of a French Business School, the perception of respondents concerning the impact of the e-learning on the pedagogical process.

The system developed and implemented was adapted to the specific challenges of a pedagogical process characterised by international diversity, variety of communication systems and standards, and complexity of cultural context.

After a discussion of the existing pedagogical theories and models applicable in the e-learning field, the study presents the particular context and the objective requirements that determined the implementation of an e-learning system. Based on the strategic objectives of implementing the e-learning system, a series of perceptual dimensions are developed and used to design the research methodology applied for collecting data. The data collected from students directly involved in the e-learning procedure are then discussed.

The paper concludes with a summary of results, presented in this context and proposes themes for future research projects on the same topic.

## **Keywords**

e-learning, perception, pedagogical process, French business school

## **Introduction**

E-learning represents one of the most rapidly expanding areas of education and training. The development of the Internet and of multimedia applications has created new opportunities for transmitting information in a pedagogical setting, and has determined an evolution of the classical models of learning.

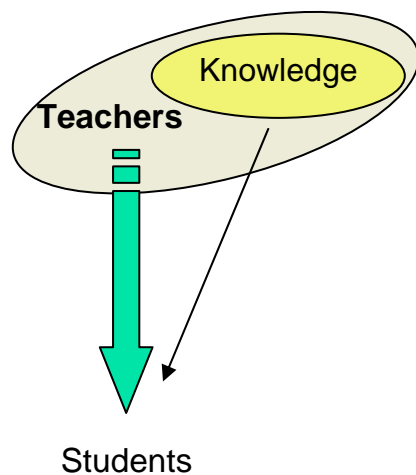
In a traditional teaching situation, the professor was not only the transmitter but often also the creator of knowledge. The students usually adopted a passive role, attending the classes and writing down the information transmitted by the professor. The communication between

fellow students, unless organised purposefully by the professor, was regarded as disruptive in the traditional classroom.

On the other hand, the implementation of an e-learning system changes the pattern of communication between professor and students. For the student, the access to information becomes easier and quicker. Sometimes, the teacher does not represent anymore a creator of knowledge, but rather a facilitator, whose function is to integrate various sources of knowledge into a logical presentation of the subject (see Figure 1). The transmission of information is much more interactive, the students being encouraged to ask questions and to provide answers. The teacher can 'feel' the reactions of the group of students and modify immediately the rhythm, the content or give more explanation on a particular point. In the virtual environment, the interaction among students is encouraged, using specific technology platforms, such as discussion forms. Despite the differences between these two learning models, the amount of knowledge remains approximately the same, since this is related with the memory capacity of each student.

This study investigates the effects of implementing and using an e-learning system in a particular higher education establishment. Beside the opportunities offered for improving the teaching process, the implementation and use of e-learning systems raise a series of important challenges. The structure and the functionality of the e-learning system should be well adapted to the institutional characteristics of the educational establishment, and represent an active tool for achieving organisational strategic objectives. On the other hand, the effectiveness of the e-learning system should be continuously evaluated and analysed in order to identify and understand the problems associated with its implementation and functioning, which increase the capacity of decision-makers to formulate and apply successful solutions.

### Traditional teaching



### E-learning

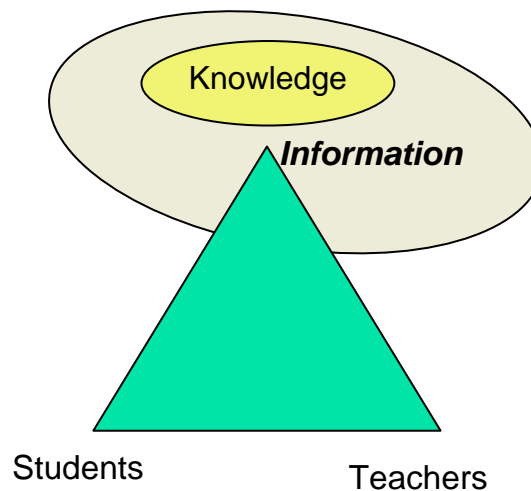


Figure 1. The change in the teacher role determined by the introduction of an e-learning system

After a discussion of the existing pedagogical theories and models applicable in the e-learning field, the study presents the particular context of Montpellier Business School and the objective requirements that determined the implementation of an e-learning system. Based on

the strategic objectives of implementing the e-learning system, a series of perceptual dimensions are developed and used to design the research methodology applied for collecting and analysing secondary and primary data. The data collected from students and teachers directly involved in the e-learning procedure are then discussed, the findings providing a good basis or a series of practical recommendations. The paper concludes with a summary of results, presented in the context of Montpellier Business School context and strategy, and proposes themes for future research projects on the same topic.

### **The learning situation**

Three main theories about learning were predominantly used to develop the theoretical foundation of e-learning: constructivism, communities of practice, and the variation of learning styles.

The constructivist theories were initiated by Jean Piaget (1975 and 1977), who studied the learning process in children. He outlined that children do not simply register the information which is transmitted to them, but that they construct models and theories about how world works, in which they assimilate what they are taught by adults. These theories or 'constructs' are permanently compared with the experienced reality, and any contradiction that is identified determines a re-construction and a modification of the mental framework (Klemm and Snell, 1996).

Vygotsky (1962 and 1978) has criticised the classical constructivist theories and added a new component, arguing that learning is seldom an individual activity, and that intelligence is developed first during the interaction with a group, followed by individual assimilation. The theory of community of practice emphasises the social aspects of the learning process, such as participation, shared and negotiated meanings, and the role of dialogue.

Another development of learning theories was related with the identification and definition of various learning styles (Honey and Mumford, 1982), or approaches to learning (Trigwell, Prosser and Lyons, 1992). Various classifications of learning styles have been created, emphasising the main characteristics of people in the learning process. For example, the classical categorisation of Honey and Mumford (1982) defines four main learning styles:

- activists – that tend to engage quickly in the learning process, and who learn from their mistakes;
- reflectors – need time to analyse the problems raised in the learning process, and develop responses to new information patterns;
- pragmatists – are inclined to try quickly the learned theories, and have a talent to understand their practical applicability; and
- theorists – who like to assimilate abstract theories and develop conceptual debates.

The psychoanalytic school proposes another interesting approach to the learning process, emphasising the role of emotions (Kannan and Miller, 2004) and the relation between the desire for knowledge, motivation and behaviour. In the psychoanalytic vision, the transmission of knowledge between professor and students can be considered a transfer process, in which students try to identify themselves with the teacher, who represents a role model (Drillon, 2002; Fenwick, 2000).

All these theories have contributed to a model of e-learning, which emphasise the need for a balance between individual work and online interaction, but also the importance of individual learning styles in adapting and achieving success in an online learning environment. This vision has to be complemented by an organisational perspective, which takes into consideration the fact that often the implementation of an e-learning system represents the solution to a problem experienced by an educational institution. Therefore, in order to understand the organisational context of the e-learning system that represents the focus of this paper, it is important to present the structure and the functions of Montpellier Business School.

### **Montpellier Business School**

Montpellier Business School was created in 1897 by the Chamber of Trade and Industry Montpellier, and has gradually evolved into the present structure. Today, Montpellier Business School is one of the Grandes Ecoles de Commerce in France, delivering undergraduate and master diplomas that are accredited by the French Ministry of Education.

A distinctive feature of Montpellier Business School is the large number of partnerships developed with foreign universities and business schools – 133 in the academic year 2004/2005. All the students registered in the undergraduate programme are spending the second year of study abroad, in a partner institution. In the academic year 2004/2005 the number of students that went to study in partner universities was 356.

Although these students get integrated into the programme taught by the partner institutions, Montpellier Business School offers them the opportunity to also follow the courses implemented by the School, which can lead to a double diploma. This system, although particularly attractive for students, has created particular constraints for the distance learning system implemented by Montpellier Business School.

The variety of pedagogical systems and programs taught in the partner universities has indicated the need of a system permitting to transmit teaching materials and information to the students involved in foreign academic programs and professional stages, in order to create a common knowledge base and a shared academic culture. The implementation of an e-learning system was selected as the logical solution to this problem.

The system developed and implemented was adapted to the specific problems of a pedagogical process characterised by international diversity, variety of communication systems and standards (with various levels of performance in terms of data transmission and reception), and complexity of cultural context. The solution selected was a robust, simplified system, permitting efficient access to online data, easy communication with the professor, as well as with other students (via email), that was better adapted to the diversity of IT networks in countries with different communication standards and technical characteristics. The system was introduced in 2001, and has gradually been improved in terms of performance and reliability.

The efficiency of an e-learning system is determined by a good interaction between the IT systems, teaching materials, professors, and students. Analysing the users' perceptions regarding the e-learning system can provide valuable data to evaluate and improve its

functioning and performance. Based on the analysis of primary data collected from students that used the e-learning system, the paper presents and discusses, in the specific context of Montpellier Business School, the perception of respondents concerning the impact of the e-learning on the pedagogical process. A series of recommendations regarding the practical aspects of e-learning system implementation are proposed, taking into account the context, strategy and organisation of the teaching organisation.

### **Research methodology**

Considering the specific situation of Montpellier Business School, this study has formulated the following research objectives:

1. To investigate the perceptions of students regarding the e-learning system
2. To evaluate the effectiveness of the e-learning system
3. To identify possible problems with the present system and find solutions for future improvement

In a theoretical paper, Hughes and Attwell (2003) propose a specific framework for evaluating e-learning, taking into consideration five categories of variables, related with the individual learner, the environment, the technology, the context and the pedagogy. The exploratory nature of this study has prevented us to investigate all these elements. In the light of these limitations, the research team has selected and adapted the variables to the context of Montpellier Business School, focusing on student's motivation and perceptions about e-learning.

In the first stage of the research process, an extensive desk research has been conducted, in order to collect secondary data related to the classical theories of learning, e-learning models and their evaluation. The analysis of this secondary data has provided a clear theoretical basis for the research project and has oriented the choice of primary data variables. In the second stage of the research, a series of face-to-face unstructured interviews have been realised with students that have used in their year abroad the e-learning system of the school, in order to identify and define the analytical elements that influence the users' perception. In the third stage of the project, base on the analysis of this qualitative data, an email questionnaire was sent to all the students that went abroad in the academic year 2004/2005 and that used the e-learning system. 97 completed questionnaires have been returned, giving a response rate of 27.24%. The primary data was introduced into the SPSS statistical software, and analysed using frequencies and cross-tabulations.

### **Presentation and analysis of data**

The 97 usable questionnaires were completed by 49 male and 48 female students. The age of respondents is between 22 and 27 years old, with a mean of 23.6 years.

The students were asked to indicate three of the most important motivations to study. Five main motivations to study have been identified (see Figure 2):

- to acquire knowledge – 91,8%;
- to share useful experience – 36,1%;
- to get a diploma – 83,5%;
- to develop a positive student-student relationship- 27,8%;
- to develop a positive student-professor relationship – 16,5%.

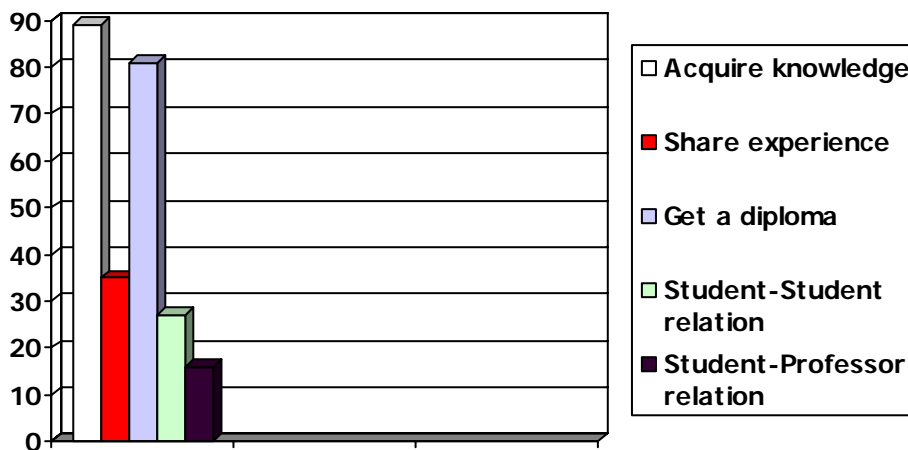


Figure 2. The main motivations to study indicated by respondents

The majority of respondents consider that e-learning is not indispensable for their studies – 55.7%, but that it is necessary – 64.9% (see Figure 3).

The ideal proportion of e-learning in a module varies, according to students’ perceptions between 50 and 0%. Most respondents have indicated a proportion of 25% as he most suitable – 59% of the respondents (See Figure 4)

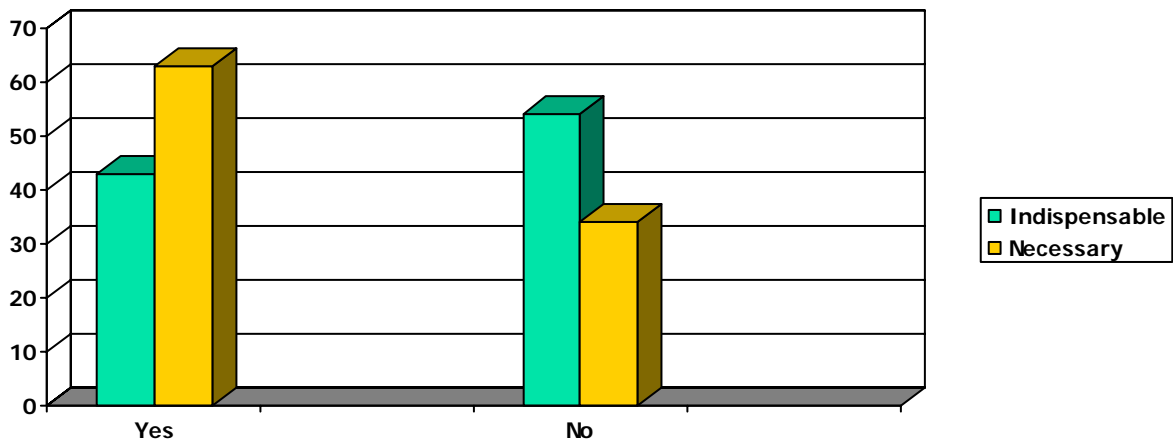


Figure 3. Students’ perception about the importance of e-learning

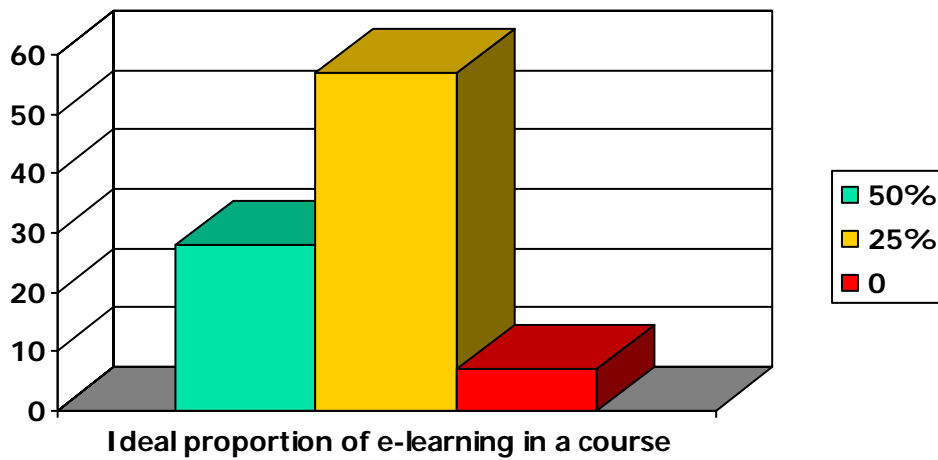


Figure 4. The perception of students about the ideal proportion of e-learning in a course

In order to identify the influence of student's type of motivation on the effects of the e-learning process, the perceptions of students about various dimensions of their work have been cross-tabulated with the main types of motivations indicated in the questionnaire.

Table 1. The effects of e-learning perceived by students with various types of motivations

Type of effects / Effects of e-learning	None		A little		Some		A lot		Very much	
	N	%	N	%	N	%	N	%	N	%
<b>Acquire Knowledge</b>										
Improved efficiency	24	27	23	25.8	29	32.6	12	13.5	1	1.1
Improved autonomy	11	12.5	17	19.3	18	20.5	35	39.8	7	<b>8</b>
Improved time control	21	23.6	7	7.9	31	34.8	23	25.8	7	<b>7.9</b>
Improved exam results	35	39.3	16	18	32	36	5	5.6	1	1.1
Clearer information	14	15.9	21	23.9	32	36.4	21	23.9	0	0
Improved motivation	22	24.7	19	21.3	32	36	14	15.7	2	2.2
<b>Share experience</b>										
Improved efficiency	8	22.9	13	37.1	11	31.4	3	8.6	0	0
Improved autonomy	2	5.7	8	22.9	9	25.7	13	37.1	3	<b>8.6</b>
Improved time control	8	22.9	6	17.1	10	28.6	10	28.6	1	2.9
Improved exam results	13	37.1	7	20	13	37.1	1	2.9	1	2.9
Clearer information	4	11.8	11	32.4	12	35.3	7	20.6	0	0
Improved motivation	8	22.9	8	22.9	12	34.3	6	17.1	1	2.9
<b>Get a diploma</b>										
Improved efficiency	22	27.5	22	27.5	27	33.8	8	10	1	1.3
Improved autonomy	10	12.5	17	21.3	16	20	32	40	5	6.3
Improved time control	19	23.5	10	12.3	27	33.3	18	22.2	7	<b>8.6</b>
Improved exam results	35	43.2	14	17.3	28	34.6	3	3.7	1	1.2
Clearer information	14	17.5	21	26.3	27	33.8	18	22.5	0	0
Improved motivation	22	27.5	18	22.5	29	36.3	10	12.5	1	1.3
<b>Student-student relationship</b>										
Improved efficiency	8	29.6	4	14.8	10	37	5	18.5	0	0
Improved autonomy	4	15.4	8	30.8	1	3.8	13	50	0	0
Improved time control	8	29.6	3	11.1	7	25.9	9	33.3	0	0
Improved exam results	13	48.1	2	7.4	10	37	2	7.4	0	0
Clearer information	3	11.1	10	37	8	29.6	6	22.2	0	0
Improved motivation	7	25.9	7	25.9	10	37	3	11.1	0	0
<b>Student-professor relationship</b>										
Improved efficiency	4	25	4	25	3	18.8	4	25	1	6.3
Improved autonomy	1	6.3	3	18.8	2	12.5	10	62.5	0	0
Improved time control	2	12.5	3	18.8	5	31.3	4	25	2	<b>12.5</b>
Improved exam results	5	31.3	3	18.8	5	31.3	3	18.8	0	0
Clearer information	2	12.5	3	18.8	7	43.8	4	25	0	0
Improved motivation	4	25	3	18.8	3	18.8	5	31.3	1	6.3

The percentages presented in Table 1 represent the proportion of students who gave particular answers to various effects of e-learning, from the total number of students that indicated a type of motivation. In order to identify the most important effects, the maximal percentage was highlighted for each type of motivation. For the students interested in acquiring knowledge, the main positive effects perceived are improved time control and improved autonomy; the students interested in sharing their experience perceive an improved autonomy,

the students that want to get a diploma perceived improved time control; and finally, very few students oriented towards a student-professor relationship experience improved time control.

Table 2. Cross tabulation between the motivation to develop relations with fellow students and the frequency of use of the email provided in the e-learning system

Motivation to develop student-student relationships / Use of email		Very often	Often	Sometimes	Rarely	Never	Total
No	N	3	6	17	21	37	80
	%	3.8	7.5	16.3	26.3	46.3	100
Yes	N	0	1	7	2	6	16
	%	0	6.3	43.8	12.5	37.5	100
Total		3	7	24	23	43	96

It is interesting to note that none of the students interested in developing student-student relationship has perceived a substantial improvement in their learning activity and results. This might be related with the specific focus of their motivation, and with the normal limitations of the e-learning system to develop close human relationships. However, when we consider the results provided by the cross-tabulation of the students motivated in developing relationships with their fellow colleagues, and the frequency with which they use the email to contact other students, the conclusion is rather a lack of students' initiative (none of the students interested in developing relations is using the email very often, and only 1 is using it often), the interactive communication tools offered by the e-learning system not being fully used (see Table 2).

In fact the use of the email is generally very rare in contacting fellow students. Only 3 respondents indicated that they use the email very often (3.1%), and 7 that are using it often (7.2%), while 43 respondents (44.3%) are never using it.

The e-learning system does not seem to encourage either the contact between student and professor: only 30.9% of respondents have indicated that they have more contact with professors online, that in a classical teaching situation, while 69.1% consider that they have less contact. This is somehow in line with the model of e-learning, which empowers the students and makes them more responsible for searching, exchanging and processing information individually.

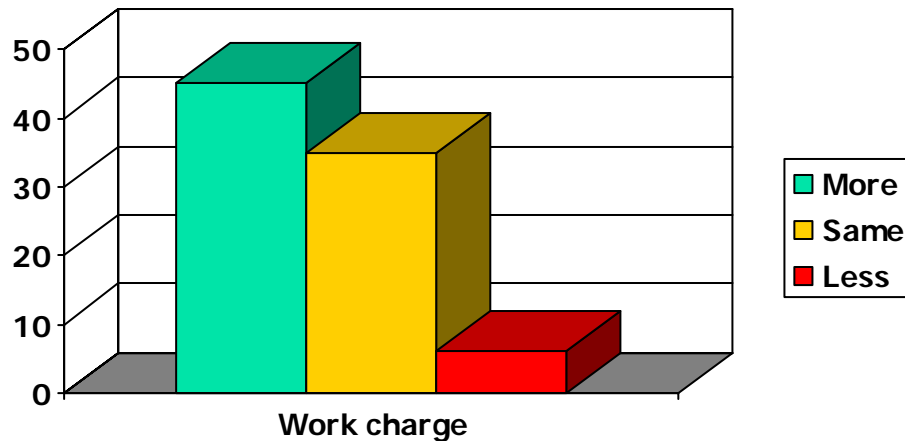


Figure 5. The perceived change in the work charge determined by the introduction of the e-learning system

In terms of work charge, the changes introduced by the e-learning system are not perceived very positively. In fact, 46.4% of the respondents indicated that the e-learning system has brought an increase in the work charge, while 36.1% consider that the amount of work has remained the same, and only 6.2% that has decreased (see Figure 5).

Considering the conflicting perceptions expressed by the investigated students, it is important to identify the expectations of respondents regarding the e-learning system. An important percentage of respondents indicated that they expect interactivity (65.3%), a varied content (64.2%) but with a selective access to information (52.6%), while 41.1% expressed they wish to have a more playful online experience (see Table 3).

Table 3. Student's expectations regarding the e-learning system

Students' expectations	Frequency	Percentage
Interactivity	62	65.3
Multimedia	20	21.1
Motivating	13	13.7
Playful	39	41.1
Varied content	61	64.2
Simplicity of content	14	14.7
Rich content	14	14.7
Selective access to information	50	52.6
Rapid access to information	19	20

In fact, the results show that the perceptions of students regarding the effectiveness of the e-learning system are split almost in half: 50.5% of the respondents indicated that they are generally satisfied with this form of teaching.

## Conclusions

The study presented in this paper outlines a complex and often conflicting perception regarding the effectiveness of an e-learning system. On one hand, the online teaching provides an increased autonomy and better time control, but students consider that it fails to insure better exam results, efficiency and motivation. On the other hand, the respondents strongly indicate that the e-learning system needs more interactive features – only very few students are using the email to communicate with their colleagues. This aspect was in fact taken into consideration, and since the academic year 2005/2006 the facility of creating and participating to discussion forums was added to the e-learning platform.

The e-learning system clearly empowers the student, but adds the responsibility of actively managing the learning process through search of information, communication with colleagues and the professor. This pro-active attitude is probably the most difficult aspect to introduce in the e-learning process, since it requires a change of mentality. The use of multimedia application to creatively enhance the online experience can facilitate this process – the respondents have indicated the need of a more interactive and playful online learning environment, as well as the use of specific incentives to initiate and maintain communication with fellow students.

The introduction of the e-learning system in the pedagogical programme of Montpellier Business School has answered to a specific problem – the need to provide standardised teaching materials for the students registered in international programmes. Since its introduction the system was developed and used also to provide online materials for courses taught to campus-based students. The simplicity of the technological platform is well adapted to the diversity of IT networks from different foreign countries, but limits the possibilities of student-student and student-professor interaction. This aspect can explain some of the negative perceptions identified among the respondents.

The study has a number of important limitations, determined by its exploratory nature. The research has focused mainly on the general answers given by the students, the main motivations to learn being the only moderating variables. The existence of various categories of students with different perceptions and attitudes regarding the effectiveness of the e-learning system can also be explained by various styles of learning – however, the study failed to investigate this important dimension. Future research into this issue should consider the measurement of additional variables such as student's learning style, the course taught online, as well as the characteristics of the IT network in the country in which the students are integrated in their second year of study.

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