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TESIS DOCTORAL

SUCCESS FACTORS IN ONLINE EDUCATION: ANALYSIS FROM THE RELATIONAL COORDINATION MODEL

FACTORES DE ÉXITO EN LA FORMACIÓN ONLINE: ANÁLISIS DESDE EL MODELO DE COORDINACIÓN RELACIONAL

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Los directores de la presente Tesis Doctoral, Dra. Carmen de Pablos Heredero y Dr. José Luis Montes Botella, damos por finalizado este trabajo titulado “Factores de éxito en la formación on line: análisis desde el modelo de coordinación relacional”, realizado por Doña Vasilica María Margalina. Lo consideramos concluido y que reúne los requisitos necesarios para su exposición y defensa ante el tribunal oportuno.

Dra. Carmen de Pablos Heredero

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RESUMEN

Los accesos a Internet cada vez son más comunes y de mejor calidad tanto en el lugar de trabajo como en el hogar. Además, la disminución progresiva de los precios de los ordenadores y de otros dispositivos electrónicos así como de las comunicaciones ha llevado a su adopción generalizada. Actualmente, hay aproximadamente 2.700 millones de personas utilizando Internet en el mundo (ITU, 2013) y casi todas las compañías de la OCDE están conectadas al Internet (Pedró, 2012).

Somos testigos de la transformación de nuestra sociedad que está invadida por las tecnologías de la información y comunicación (TIC), que están impulsando la globalización económica, social y cultural de nuestra sociedad, en la que el conocimiento se genera de forma acelerada y se difunde con rapidez. El desarrollo de la economía del conocimiento, tan penetrada por las TIC, no transforma sólo las empresas sino también el mercado laboral que demanda una formación más flexible y nuevas habilidades para los empleados.

Esta transformación afecta tanto la educación convencional como a la formación de los trabajadores. La educación online, también denominada e-Learning, es una opción cada vez más atractiva para las instituciones educativas y las compañías privadas, porque les ayuda a competir en un mercado globalizado. Además, e-Learning ofrece flexibilidad, la posibilidad de reducir costes y mejorar la calidad y la eficiencia y aumenta el acceso a la educación y formación. Sin embargo, e-Learning no sólo presenta estas ventajas sino también varios desafíos. Entre estos destaca el aumento de la importancia de la calidad como factor de competitividad para las instituciones y empresas que ofrecen cursos y formación online y la necesidad de desarrollar estándares de calidad específicos para e-Learning. Esto se debe a las bajas tasas de retención, una imagen de peor calidad en comparación con la educación convencional y al aumento de la competencia en el mercado de la educación. Además, la calidad en e-Learning se ve cada vez más como el resultado de las demandas y necesidades de varias partes involucradas en el proceso de aprendizaje.

Gittell (2009) ha propuesto un modelo de coordinación relacional que pone énfasis en la comprensión de la importancia de la coordinación de las relaciones y la dinámica de la comunicación en las organizaciones para mejorar los resultados. La aplicación del modelo ha dado buenos resultados en términos de rendimiento y calidad en organizaciones en las que los procesos se caracterizan por interdependencias de tareas, incertidumbre, restricciones de tiempo y conocimiento tácito, como las compañías aéreas, organizaciones de cuidado de la salud (Gittell, 2001, 2002a, 2009; De Pablos and Haider, 2013) y educación (De Pablos, 2013 a,b,c).

Los investigadores en el ámbito del e-Learning han demostrado que los resultados del e-Learning no dependen sólo de la calidad de la tecnología, sino también de la calidad de la comunicación e interacción (Anderson, 2003; Lee et al., 2010), la gestión del tiempo (Soong et al., 2004; Lee, 2010), los conocimientos compartidos (Liaw et al., 2007) y el respeto social (Sung y Meyer, 2012).

Dado el panorama descrito, el presente trabajo se plantea como objetivo analizar si la aplicación del modelo de coordinación relacional en las prácticas de e-Learning pueden explicar mejores resultados en la consecución de la satisfacción, uno de los principales factores que afectan la calidad del aprendizaje online, de dos perfiles claves en el proceso, los alumnos y los profesores.

Capítulo 1. E-learning

El origen del término e-Learning procede del ámbito de las empresas privadas dedicadas a la formación continua. El acuñamiento del término e-Learning se le atribuye a Jay Cross, el fundador de Internet Time Group (Cross, 1994).

Todas las definiciones del término e-Learning, ofrecidas por la literatura más destacable en el ámbito como la ASTD (American Society of Training and Development), Rosenberg (2001) y la Comisión Europea (2001), incluyen el uso de las TIC en el aprendizaje. Por eso, en este trabajo de investigación definimos e-Learning como *el proceso de aprendizaje que tiene lugar a través de las tecnologías de la información y comunicación, que permiten el intercambio de conocimientos y la comunicación entre los participantes en el proceso*.

Existen varias versiones entorno a cuando surgió el e-Learning. Los autores de la primera mencionan la educación a distancia como el precursor de la educación online (Bacsich et al., 2010a), tomando como punto de partida la mitad del siglo XIX (Martínez Caro, 2006; Writers, 2010). Otros autores comienzan la historia del e-Learning con los primeros años del siglo XX cuando la televisión y la radio (Reiser, 2001) y la “maquina de aprendizaje” de Sidney Pressey empezaron a ser utilizados en la educación. Muchos autores relacionan el surgimiento y desarrollo de las tecnologías de la información y comunicación, en los comienzos de los años 1980, con el comienzo de está modalidad de educación (Cross, 2004; Littlejohn y Pegler, 2007; Area, 2009).

A finales de los años noventa, con la propagación de Internet, la bajada de los precios de los ordenadores y redes de comunicaciones y el apoyo de los gobiernos e instituciones públicas, como la administración Clinton y la Comisión Europea (Gore, 1992; Comisión Europea, 1995), e-Learning comenzó a registrar altas tasas de crecimiento en todo el mundo.

Desde entonces, el número de estudiantes matriculados en los cursos online no ha dejado de crecer. La adopción de las TIC en la educación varía mucho de un país a otro. America del Norte es el mercado del e-Learning más maduro del mundo, con una cota de mercado del 61,7% en 2011 (Ambient Insight, 2012a). En Estados Unidos, el número de estudiantes matriculados en al menos un curso online creció desde 1.602.970 en 2002 hasta 7.126.549 in 2012 (Grade Change, 2014). Europa registró también crecimientos de entre 15%-20% de alumnos registrados en los cursos online, mientras que la oferta creció un 40% (Study Portals, 2012). Hasta 2016 se esperan altas tasas de crecimiento en las demás regiones también (Ambient Insight, 2012 c,d,e,f; 2013).

Los actores en el mercado cubren una gran área de actividades de educación y formación, desde el diseño de aprendizaje, creación y entrega de contenidos, hasta los proveedores de tecnología y servicios de consultoría y auditoría. El mercado de la educación, antes controlado exclusivamente por el Estado, está siendo invadido cada vez más por las empresas privadas (Schneckenberg, 2004).

El mercado del e-Learning tiene un alto grado de complejidad y su cadena de valor todavía se está construyendo (Massy, 2004). Se puede distinguir en el mercado tres tipos de demanda: el sector académico, administraciones públicas y compañías privadas. El comportamiento de estos tres tipos de demanda no es el mismo y quedan afectados de diferente manera por los ciclos económicos. Por lo general, hay más demanda de servicios, tecnologías, contenido en el aprendizaje corporativo, pero las inversiones y políticas públicas han estimulado la demanda de productos y servicios de e-learning en todos los segmentos (Massy, 2004). La oferta se caracteriza por la dispersión y heterogeneidad (Martínez Caro, 2006). Se puede identificar tres tipos de oferta según la especialización de los proveedores: de contenido, tecnología y servicios. El contenido y los cursos se suelen desarrollar internamente o son ofrecidos por los grandes editores. Algunas tendencias importantes en todo el mundo son la creación de universidades virtuales nacionales (Ambient Insight, 2014) y de universidades corporativas (Simpsons, 2012) y la aparición de los recursos educativos abiertos (OER) y de los cursos masivos abiertos en línea (MOOCs) (Comisión Europea, 2013). En el mercado existe también una gran variedad de proveedores de tecnología desde simples herramientas de edición web a aplicaciones informáticas más complejas de colaboración edición y distribución de contenidos, hardware interactivo, herramientas de simulación y juegos. Los productos más utilizados son los denominados sistemas de aprendizaje (LMS), con Balckboard, WebCT (Holmes y Gardner, 2006; Coll y Monereo, 2008) y, en los últimos años, los sistemas de código abierto como Moodle. Los proveedores de servicios ofrecen portales de aprendizaje, servicios de aplicaciones (ASP), servicios de valor de aprendizaje móvil (VAS) y otros servicios profesionales.

Capítulo 2. Calidad en el e-Learning

Es difícil de trasladar al ámbito de educación las definiciones convencionales de calidad, ya que en el proceso de aprendizaje hay muchas partes involucradas. Si las instituciones educativas y las empresas de formación no tienen en cuenta las expectativas de los estudiantes y de los que pagan por sus servicios, ponen en riesgo su supervivencia.

La calidad no es una característica fija perteneciente a sujetos o sistemas. Es el resultado entre el aprendizaje (visto como el resultado, el proceso o el sistema de educación) y las demandas, objetivos, estándares (reglamentos) y los requisitos establecidos por los individuos, las empresas, organizaciones comunidad local, gobiernos y sociedad (Rubin, 2010).

Hay diferentes enfoques de la calidad en el e-Learning, dependiendo de los sistemas de educación y las tradiciones. Pero, en general, hay principalmente tres enfoques de la calidad en educación: acreditación, evaluación y auditoría (Kis, 2005). Distintas autoridades públicas y agencias de acreditación públicas y privadas, como la EFQUEL (Fundación Europea por la Calidad en e-Learning), QAA (Quality Assurance Agency) en Reíno Unido, IEEE (Institute of Electrical and Electronics Engineers) y ASTD (American Society for Training and Development), han introducido estándares de calidad en e-Learning.

Como el e-Learning tiene múltiples dimensiones, su éxito depende de muchos factores. Estos factores se pueden clasificar en: tecnológicos, organizativos y otros factores. Los factores tecnológicos más importantes que afectan la calidad en e-Learning son: la accesibilidad (Lorenzo y Moore, 2002), la utilidad percibida y la facilidad de uso percibida (Davis, 1989). Entre los factores organizativos, encontramos la comunicación (Area y Segura, 2009), la satisfacción de los alumnos, profesores y los demás participantes en el proceso de aprendizaje (Lee, 2010) y la coordinación (De Pablos et al., 2013a). Pero existen también otros factores que afectan la calidad en el e-Learning como: la interacción con el contenido (Anderson, 2003), la calidad de los recursos de aprendizaje, el contexto y apoyo social (Sallis, 2002), los valores culturales (Zaharias, 2008) y el compromiso institucional (Venkatesh y Davis, 2000).

Capítulo 3. La coordinación relacional en e-Leraning

La coordinación es uno de los factores organizativos que afecta la calidad en el e-Learning y se comprende cada vez más como un proceso relacional (Faraj y Sproull, 2000; Gittell, 2001). Gittell, (2011) define la *coordinación relacional* como la comunicación y relación necesarias para la integración de tareas. Propone un modelo de coordinación relacional que pone énfasis en la importancia de coordinar las relaciones y las dinámicas de la comunicación para obtener los mejores

resultados. Según el modelo, los procesos de coordinación tienen lugar a través de relaciones de objetivos y conocimiento compartido y respeto mutuo, apoyado por una comunicación frecuente, oportuna y que resuelve problemas.

Gittell basa su teoría en el análisis hecho por los teóricos de la organización, que observaron una forma más espontánea de la coordinación, adaptación mutua (Thompson, 1967) y trabajo en equipo (Van de Ven et al., 1976), otros puntos de vista de la coordinación (Hackman, 1987; Malone y Crowston, 1994) y el foco de la coordinación basado en las relaciones (Faraj y Xiao, 2006; Heckser y Adler, 2007; Heckser et al., 2009) en entornos corporativos de alta/ baja interdependencia/ incertidumbre. Explica que su modelo se diferencia de los demás. Mientras en otros modelos el conocimiento compartido es importante, Gittell argumenta que, aunque es importante, necesita objetivos compartidos, respeto mutuo y las dimensiones de la comunicación. También difiere de los demás modelos, ya que se centra en las relaciones entre los roles y no entre los individuos específicos.

La coordinación relacional mejora el rendimiento de un proceso de trabajo con interdependencias de tareas, incertidumbre, falta de tiempo y conocimiento tácito, reforzados por una comunicación de alta calidad (Gittell, 2009, 2011). Estas circunstancias son también características del e-Learning. Existen interdependencias en las tareas compartidas por el profesor y los alumnos. El profesor tiene que crear y presentar el contenido para que el alumno lo entienda fácilmente, pero el resultado final depende también de los esfuerzos del alumno para comprenderlo. Los procesos de enseñanza y aprendizaje en e-Learning presentan hoy en día ciertos niveles de incertidumbre debido a la falta de información. El profesor no tiene información sobre las habilidades digitales del alumno y la falta del lenguaje corporal lleva a situaciones de incertidumbre (Willis y Dickinson, 1997). Las tareas en e-Learning se caracterizan frecuentemente por restricciones de tiempo: los cursos tienen una duración limitada en el tiempo, los estudiantes tienen períodos de tiempo establecidos para la completar los ejercicios y la evaluación y existe la necesidad de dar y recibir retroalimentación de manera oportuna (Song et al., 2004). En los procesos de enseñanza y aprendizaje siempre existe un cierto nivel de conocimiento tácito que es difícil explicitar para los profesores y los alumnos.

4. El estudio empírico

El objetivo principal de está investigación es evaluar el impacto de la coordinación relacional en dos pilares fundamentales para la calidad de la formación online, la satisfacción de los estudiantes y la satisfacción de los profesores con su trabajo. Para este propósito, se realizó un análisis empírico de dos muestras representativas de estudiantes y profesores participan en cursos online en las universidades y las empresas privadas de e-Learning.

Los datos se han obtenido utilizando un cuestionario estructurado adaptado de De Pablos et al. (2013) para cada muestra. Ambos cuestionarios incluyen preguntas relativas a los datos personales, el contexto del curso, la tecnología utilizada para impartir el curso, la coordinación relacional y la satisfacción final. Todas las respuestas han sido colectadas online y se han recibido 134 respuestas de alumnos y 38 de profesores.

Para el análisis empírico se han utilizado dos modelos de ecuaciones estructurales (SEM). La variable final medida es distinta en los dos casos, ya que medimos la satisfacción final con los cursos online, en el caso de los alumnos, y la satisfacción final con el trabajo, en el caso de los profesores. También se establecen algunas relaciones distintas, como son, por ejemplo, las relaciones que los alumnos establecen con sus compañeros de curso y las relaciones que los profesores mantienen con otros profesores y personas que trabajan en la misma institución. Por tanto, se ha realizado un análisis diferente de las seis hipótesis planteadas, utilizando un modelo distinto con la misma estructura para cada una de las muestras. La siguiente tabla (Tabla 1) presenta los resultados del análisis empírico de las seis hipótesis planteadas en los dos modelos.

PLS-SEM fue elegido para estimar el modelo debido a que el fenómeno investigado es relativamente nuevo y su modelado se encuentra en una etapa de desarrollo, existen recomendaciones mínimas en relación con el tamaño de la muestra (el algoritmo PLS converge en la mayoría de los casos alcanzando una alta potencia estadística incluso con muestras de tamaño reducido y es robusto frente a las ausencias de datos). También presenta precisión de la predicción (Henseler et al., 2009; Joreskög y Wold, 1982).

Tabla 1. Las hipótesis validadas en el análisis empírico de los dos modelos

Hipótesis	Apoyo empírico alumnos	Apoyo empírico profesores
H1: La comunicación frecuente (FC), oportuna (TC) y que resulte problemas (PS) tiene un impacto positivo sobre las dimensiones de las relaciones, objetivos compartidos (SG), conocimiento compartido (SK) y respeto mutuo (MR).	**SI** - FC incrementa SG - FC tiene un efecto positivo sobre MR - TC incrementa SK - PS incrementa MR	**SI** - FC incrementa MR - TC incrementa SK
H2: La comunicación para resolver problemas (PS) tiene un impacto positivo sobre la calidad de las	**SI**	**NO**

relaciones.		
H3: Las relaciones basadas en objetivos compartidos (SG), conocimiento compartido (SK) y respeto mutuo (MR) aumentan la satisfacción de los alumnos y los profesores con el trabajo de los demás perfiles que participan en el proceso del e-Learning.	**SI** - MR aumenta SR	**SI** - MR y SK incrementa SR
H4: Las relaciones de calidad (SR) tienen un efecto positivo sobre la satisfacción de los alumnos y profesores con la plataforma online (SP) utilizada para impartir el curso.	**SI**	**SI**
H5: La satisfacción de los alumnos y los profesores con la plataforma online (SP) aumenta la satisfacción de los alumnos con los cursos online y la satisfacción de los profesores con su trabajo (FS).	**SI**	**NO**
H6: Las relaciones de alta calidad (SR) incrementan la satisfacción final (FS) de los alumnos y los profesores con el e-Learning.	**SI**	**SI**

En el caso de los estudiantes también se ha comparado estadísticamente los alumnos que estaban haciendo el curso online con una universidad con los que hacían el curso con una empresa. Con la excepción de H4, todas las hipótesis han mostrado, al menos parcialmente, diferencias. Las más importantes diferencias que se han encontrado entre los dos grupos son: la relación entre respeto mutuo (MR) y la calidad de las relaciones (SR) que sólo tiene valor estadístico en el caso de los alumnos que han hecho el curso con una universidad; la satisfacción con la tecnología (SP) utilizada para impartir tienen un impacto mayor en la satisfacción final (FS) de los alumnos que han hecho el curso con una empresa, mientras que en caso de los alumnos de universidad, la calidad de las relaciones (SR) tienen un efecto mayor en su satisfacción final (FS). El análisis estadístico de la muestra de alumnos corrobora también que la comunicación para resolver problemas (PS) es una

variable moderadora entre el respeto mutuo (MR) y la calidad de las relaciones (SR) y MR modera la relación entre objetivos compartidos (SG) y conocimiento compartido (SK).

Conclusiones

Mediante el estudio empírico se ha podido comprobar que la aplicación del modelo de coordinación relacional puede determinar altos niveles de satisfacción de los alumnos con los cursos online y de los profesores de formación online con su trabajo. Las relaciones de calidad, basadas en el respeto mutuo, y apoyadas por objetivos compartidos, conocimiento compartido y una comunicación frecuente, oportuna y que resuelve problemas, no sólo incrementa la satisfacción final de los alumnos y profesores con el e-Learning, sino que también mejoran la satisfacción con la tecnología utilizada para impartir el curso. Los resultados de este estudio muestran que mediante la implementación de mecanismos de coordinación relacional, las instituciones de e-Learning pueden conseguir mejores resultados en términos de satisfacción de los estudiantes y profesores.

Las conclusiones de este estudio sugieren algunas directrices interesantes para la creación e implementación de mecanismos de coordinación relacional. El E-learning tiene ser visto como un proceso que conecta a todos los participantes. Las instituciones tienen que identificar y definir los procesos, clarificar los roles de los participantes y ofrecer seguridad psicológica para que las personas encuentren las mejores formas de comunicarse y relacionarse. La tecnología utilizada para impartir la formación debe cumplir las expectativas de los participantes, ya que, como muestra el estudio, la satisfacción con la plataforma online tiene un impacto en la satisfacción de los alumnos con los cursos online.

El fenómeno analizado es relativamente nuevo y requiere del desarrollo de futuras líneas de investigación. El estudio debe ser extendido a muestras de alumnos y profesores de mayor tamaño y a otras regiones geográficas. Un análisis de muestras donde los métodos de enseñanza y la organización interna de las instituciones ya son conocidos, ayudaría a determinar la importancia de más roles de los participantes en el proceso.

INTRODUCTION

INTRODUCTION

The improved access to Internet and lower prices of computers and electronic devices has led to their widespread adoption. Information and Communication Technologies (ICT) have become part of the way people interact, work and trade. There are now over 2.7 billion people using the Internet all over the world (International Telecommunication Union, 2013) and almost all companies in OECD are connected to Internet (Pedró, 2012).

We are witnessing the transformation of our society that is invaded by the ITC, which are encouraging the economic, social and cultural globalization and the fast generation and sharing of knowledge. The emerging knowledge economy, so permeated by technology, not only transforms business but also shapes the labour market that demands a more flexible education and training, new skills for employees and more training for new social groups.

In the late 1990s, the term e-learning begun to be used as referring to the use of ICT in education and training. Big companies have been the first to adopt e-learning for training due to their promise of lowering costs and as a consequence of globalization and the emergence of the knowledge economy. Later on, international reports begun to warn about the need of public educational institutions to adapt to the characteristics of a globalized world and to the new demands of the labour market (European Commission, 1995, 2001; OECD, 2007). Accordingly, governments have allocated funds for the adoption of digital technologies in universities and public schools. In recent years, governments have started to support the creation of national virtual universities.

But, many of these public investments did not have the expected performance. Nevertheless, the adoption of e-learning has brought a radical change in education and training that it is here to last. Since thee early 2000, e-learning has continually growing in higher education in USA and Europe and it is spreading in emerging countries and in PreK-12 education. In USA, the most mature e-learning market in the world was reached the total number of 7.1 millions student enrolments in the fall 2012.

The e-learning market is continually evolving and it presents a high degree of complexity with a wide variety of players. The academic sector and schools are including e-learning services and technologies in their education programmes. Businesses, associations, non-profit organizations and public administrations are buying e-learning training and technologies for their employees and other stakeholders. The educational offer, which was previously controlled by the state, is systematically invaded by private companies and institutions. Public universities and schools are often producing the e-learning resources internally, but large publishers also playing an important role in the market. The offer of e-learning technologies is dominated by private companies that develop from authoring tools,

computing devices, audio and video technology, simulation and gaming tools to learning management systems (LMSs). But, in recent years, many partnerships have been created between public institutions and private companies for the creation and distribution of e-learning resources and, also, for the development of e-learning technologies.

E-learning is seen as an attractive option for educational institutions and companies, because it allows the offering of education and training to large groups of people regardless of their location. Additionally, learners and teachers can access and interact with the educational content anytime and from anyplace. E-learning can help companies to compete in a globalized market, as it can reduce costs, improve quality and efficiency and increase the access to education and training. However, institutions and companies that offer e-learning-based education and training must face different challenges. One of the main challenges that e-learning institutions must face nowadays is represented by the increased competition in the educational market. International trade of learning services and products is increasing, especially in higher education and corporate training, with more and more countries becoming net exporters of education. Another trend in e-learning is the development of Open Educational Resources (OER) and Massive Open Online Courses (MOOCs). Other challenges that e-learning institutions must face are the low retention rates and an image of an inferior quality compared with conventional education.

As quality has become the main competitiveness indicator for education, e-learning had to develop its own quality standards. In recent years, public and private accreditation agencies have created quality standards, especially based on approaches to quality coming from outside of the sector, such as the ISO 9001 Quality Management Standard and the Total Quality Management approach. The factors affecting quality that are usually taken into account by accreditation agencies in creating the standards are: technology, organizational factors (communication and student satisfaction) and the access and quality of educational resources.

But, quality is increasingly seen as the result between learning and the demands, goals, standards and requirements set by different stakeholders (Rubin, 2010). Therefore, when creating quality standards, accreditation agencies and e-learning institutions, in general, should also take in consideration other organizational factors, such as, coordination.

E-learning institutions must also face some characteristics of their organizational processes. The tasks of their employees are often interdependent and the final purpose of the teaching process depends on the interaction between the learners and other participant in the process (e.g. teacher, other students, other employees of the institution). The fact that during the e-learning process the teacher, the learner and other participants are often separated in place and time, can led to uncertainty. As, e-

learning courses or programmes have a limited duration time, e-learning processes are characterized by time restrictions. And, there is always a certain degree of tacit knowledge that is difficult to make explicit.

Gittell (2009) has proposed a model of relational coordination that put emphasis on understanding the importance of coordinating the relationships and the dynamics of communication in organizations to reach best results. Relational coordination is produced by providing mechanisms that allow the sharing of goals and knowledge and mutual respect, supported by frequent, timely and problem solving communication. The model reached promising results in organizations where organizational processes are characterized by task interdependencies, uncertainty, time restrictions and tacit knowledge, such as, airlines and healthcare organizations. Later, De Pablos et al. (2013 a,b,c) have proven that the application of this model in higher education for both students and lecturers leads to positive results in terms of performance.

Researches in the e-learning field have shown that learning performance in e-learning is not only depending on the quality of technology, but also on the quality of communication and interaction (Anderson, 2003; Lee et al., 2010), time management (Soong et al, 2004; Lee, 2010), the knowledge sharing (Liaw et al., 2007) and on social respect (Sung and Mayer, 2012).

The quality of e-learning depends mainly on the quality of interaction between the learner and the teacher. Several studies have shown that best results in e-learning depend on the attitudes towards this type of education of these two profiles (Webster and Hackley, 1997; Sun et al., 2008) and their attitudes and behaviour are driven by perceptions. Hence, in this study we have applied the model of relational coordination to evaluate learners' and teachers' final satisfaction in e-learning-based education and training.

This doctoral thesis is structured in four parts and five chapters, as it is shown in Figure 1. Apart from the introduction and conclusions (chapter 5), the thesis it is also divided in a theoretical framework and an empirical study.

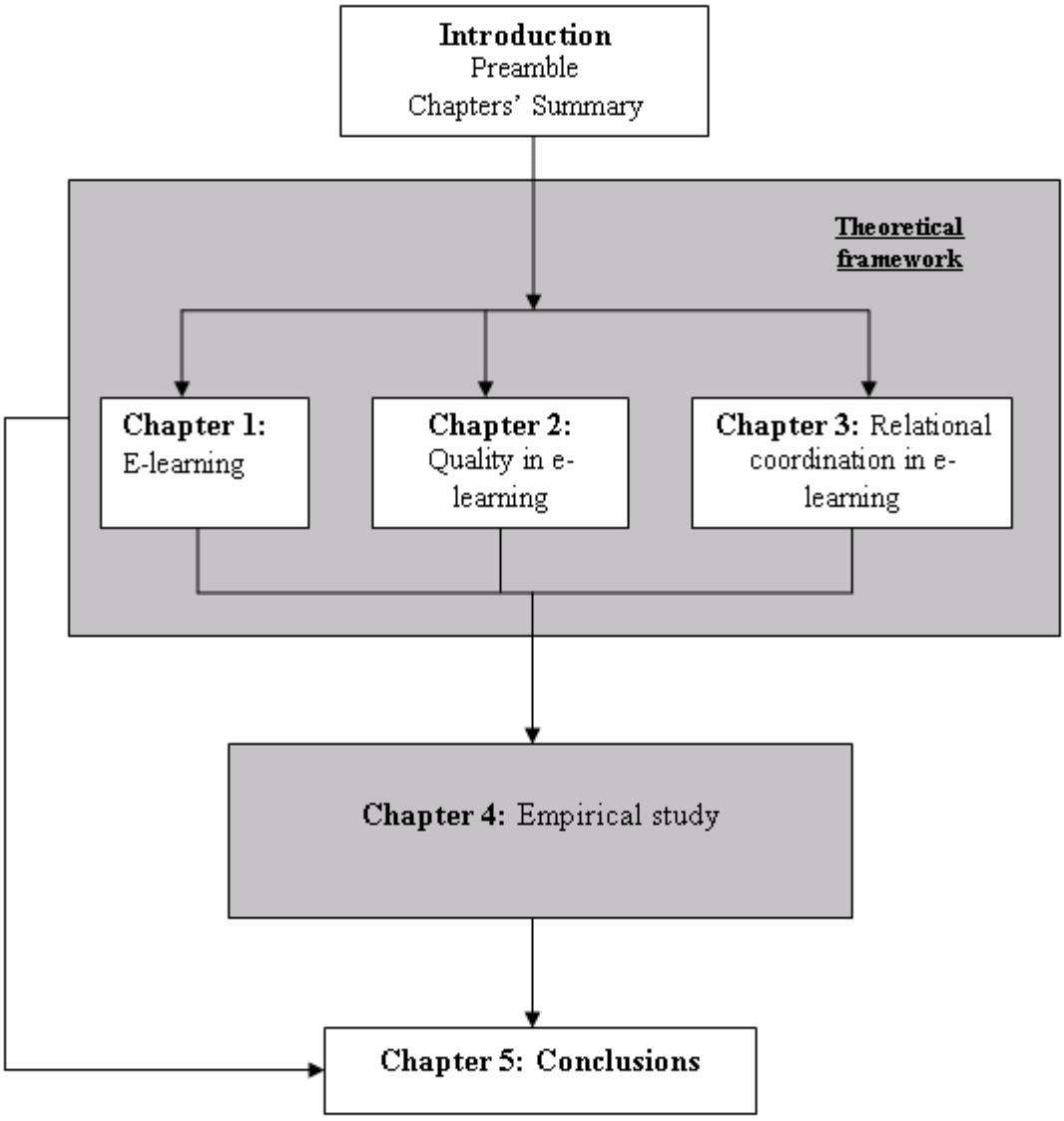

Figure1. The structure of the doctoral thesis

Summary of the Thesis Chapters

As Figure 1 shows, apart from the Introduction, the doctoral thesis consists of five chapters containing the theoretical framework, the empirical study and the conclusions. The thesis is structured as follows.

Theoretical framework

The theoretical framework concerning e-learning, e-learning quality and relational coordination is presented in the first three chapters.

Chapter 1. E-Learning

This chapter starts with clarifying and defining the term e-learning. Next, it presents a short history of e-learning, identifying key moments in the development of this form of education and presenting its evolution in time, in terms of student enrolments and online courses offered. The third part of this chapter presents the structure of the e-learning market, its characteristics, the most important players in the market around the world and a short term outlook. The chapter ends with the presentation of the advantages and disadvantages of e-learning and of its costs and benefits.

Chapter 2. Quality in e-learning

The second chapter begins with the explanation the term of quality and its particularities when it is applied to education. Then, the reasons why the quality has become an important issue in e-learning in recent years are being set out. The second part of this chapter also presents the main approaches to quality in e-learning and the standards that have been developed by accreditation agencies. Finally, the factors affecting quality in e-learning are being analyzed, with emphasis on the technological and organizational factors.

Chapter 3. Relational coordination

As the focus of this research is relational coordination, the main objective of this chapter is to explain this concept and to justify its importance for e-learning. Therefore, the chapter begins with the definition of relational coordination. Later on, the relational coordination model proposed by Gittell is presented and explained. And last, the importance of relational coordination in e-learning and the reasons why Gittell's model has been chosen for this study are analyzed.

The empirical study

After the presentation of the theoretical framework regarding the concepts addressed in the study, e-learning, quality in e-learning and relational coordination, the next chapter focuses on the empirical study.

Chapter 4. Empirical study

The presentation of the proposed model and hypotheses opens the fourth chapter. With the six hypotheses explained in this chapter, we are analyzing if the model of relational coordination explains high degrees of learners' and teachers' final satisfaction with e-learning. In this part of the chapter, we also explain the differences between the two profiles and why we have chosen to use two different models for the empirical analysis. The second part of this chapter is focus on the methodology (data collection, questionnaires, sample characteristics and methods of analysis). The fourth chapter ends with the reflection and presentation of the results obtained in the study.

Chapter 5. Conclusions

Finally, this doctoral thesis presents the conclusions and most relevant contributions, as well as the limitations of the study and a proposal of further research areas. We also put emphasis on how e-learning institutions can develop relational coordination mechanisms.

CHAPTER 1: e-LEARNING

1.1. **What Is e-Learning?**

1.2. **A Brief History of e-Learning**

1.3. **The e-Learning Market**

1.3.1. The Demand

1.3.2. The e-Learning Offer

1.4. **Advantages and Disadvantages of e-Learning. Costs and Benefits**

1. E-LEARNING

1.1 What Is e-Learning?

The term *e-Learning* is relatively new and we can find many different definitions and uses of the term in the literature. Even its origins are not clear. Some authors suggest that we can find the origins of e-learning in the 1980's (Moore, Dickson-Deane and Galyen, 2011). Others affirm that it was in the late 1990s, when the term begun to be used (Cross, 2004; Mason and Rennie, 2006; Area and Segura, 2009) in corporate training. Cross (2004) admits that he has coined the term e-learning in 1998, although he mentions that others may have used the word simultaneously. But the term e-learning begun to be frequently used in education in 2002 (Littlejohn and Pegler, 2007).

Mason and Rennie (2006) have classified the definitions of e-learning in three groups, depending on their emphasis: those focused on the content, on the communication and the technology.

One of the early definitions (Mason and Rennie, 2006) was given by the ASTD[12] (American Society for Training and Development) who defines e-Learning (electronic learning) as a "term covering a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classroom, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and video-tape, satellite broadcast, interactive TV, CD-ROM, and more". This definition focuses on technology and it includes a wide variety of technologies through which the learning content can be delivered.

Other definitions put emphasis on the use of internet technologies, such as, for example, the definition given by Rosenberg (2001: 28): "E-Learning is the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance. It is networked, delivered to the end-user via a computer using standard internet technology and focuses on the broadest view of learning".

The definition offered by the Open and Distance Learning Quality Council of the UK makes the distinction between the learning content and process (Mason and Rennie, 2006: XIV): "E-Learning is the effective learning process created by combining quality delivered content with (learning) support and services". Instead, the definition given by Wilson et al. (2002: 4) is focused on the process of

[1] ASTD's definition of e-learning can be found on its website: http://www.astd.org/Publications/Newsletters/Learning-Circuits/Glossary

[2] On May 2014, ASTD (American Society for Training and Development) has changed its name in ATD (Association for Talent Development).

learning and its location: "the combination of learning services and technology to provide high value integrated learning; anytime, anyplace".

In 2001, European Commission, on its eLearning Action Plan, has offered a definition focused on the final aim of the e-learning process, to achieve the quality of learning: "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (European Commission, 2001:2).

These definitions have something in common, as they all make reference to the use of technology and Internet in the learning process.

There are other terms to describe roughly the same activity (Mason and Rennie, 2006; Moore et al., 2011), such as *web-based learning*, *computer-based learning*, *computer-mediated learning*, *online education*, *online learning* (ASTD[3]) or *virtual learning*[4] (Ehlers and Mandernach, 2009). All these variations in terms and definitions are caused by the different evolution of English as its use became increasingly widespread (Mason and Rennie, 2006) and by changes in the field (Littlejohn and Pegler, 2007; Moore et al., 2011; Area, 2012). The lack of consensus on the use of these terms can create confusion. Even variants of the actual spelling of the term can be found throughout the literature (i.e. elearning, e-learning, e-Learning, eLearning).

Some others even refer to e-learning as a form of distance education (Martínez Caro, 2006; Simpsons, 2012). *Distance education* is the delivery of learning material, using both print and electronic media, the teacher and learner being separated in space and time (Moore, et al, 2011). But, nowadays, e-learning includes activities that differ from those of distance education, as there are a growing number of applications used in both face-to-face learning and fully distance learning.

The term e-learning is increasingly used as an umbrella term (Littlejohn and Pegler, 2007) to describe all the others mentioned before. Nowadays, e-learning is the most used term all over the world when referring to the use of Internet and new technologies in education and training, not only at a corporate level, but it is also used by international institutions, such as the European Commission, OCDE and UNESCO.

E-learning is a term difficult to define and, due to the progress of technologies, it is continually changing. For this research, we will define shortly e-learning as *the learning process supported by*

[3] The definitions of web-based learning, computer-based learning, computer-mediated learning, online education, online learning can be found on ASTD's website or in the Glossary page 99.
[3] http://www.astd.org/Publications/Newsletters/Learning-Circuits/Glossary
[4] The term virtual learning is defined in the Glossary page 104.

internet and new technologies that enable the sharing of knowledge and the communication among participants involved in the process.

1.2 A Brief History of E-Learning

As it happens with the term e-Learning, there are different versions regarding the moment when this form of learning emerged. These versions are built around the meaning given to the term e-Learning. But we can identify three main theories about the history of e-learning: one that refers to distance education as the precursor of e-learning, a second one, that takes in consideration all the technologies applied to education and, the third one, that takes as the start point of e-learning, the introduction of personal computers and Internet in education.

Distance education is often understood as the precursor of online learning (Bacsich et al., 2010a). The authors that refer to e-learning as a modern form of distance education take the reader back in the history till the mid-1800s, when the correspondence home-study courses begun in the US, France, Germany and the UK (Martínez Caro, 2006; Writers, 2010).

Those authors sustaining that e-learning includes a wider range of technologies take us back to the first moment of the use of technologies in education, such as radio, television or other types of teaching machines. Reiser (2001) begins the history with the first decade of the 20th century, when media, such as film and radio were introduced for instructional purposes (Cuban, 1986). Holmes and Gardner (2006) describe that the story begins in 1926 with Sidney Pressey's "teaching machine", an apparatus that offered practical exercises and multiple choice answers.

Often, the rising of information technologies is mentioned as the beginning of e-learning. Authors, such as, Cross (2004), Littlejohn and Pegler (2007), Area (2009), mention as the start point for e-learning the early 1980s, when personal computers became affordable for companies and for some universities to buy for employees and student use.

In the late 1990s Internet begins to be used in education and training (Reiser, 2011; Martínez Caro, 2006). The eased and improved access to network technology and a lower cost of computers (Area, 2009) and of other electronic devices has led to the widespread use of ICT at home, work, schools, universities, public administration and other institutions. In this context, the interest for e-learning recorded a rapid growth all over the world.

The use of technology in education has always been supported by governments even since the period of instructional radio and television. The State Departments of Education of United Stated

sponsored radio use for education in the 1930s and, later, with the arising of instructional television in 1950s a national programme was created to promote its use in public schools (Bates, 1986). In the late 1970s and early 1980s western governments incorporated for the first time in their policies the need of introducing computers in schools (Area, 2008).

In the late of 1990s, due to the widespread of the use of ICT, Clinton administration in the USA and the European Commission strongly supported the use of digital technologies as a condition for the development of what has been called as 'the knowledge society' (European Commission, 1995; Gore, 1992). The e-Learning programme adopted at the Lisbon meeting by the European Union presented as a key objective the endowment of all European schools with Internet by the end of 2001 (European Commission, 2001). This program was then adapted by each country of the European Union. For example, in Spain, the Plan Info XXI was published in January of 2001 (Area, 2005). The European Union has dedicated massive founds and resources to researching the present role and the future potential for e-Learning environments, allocating a budget of 16 billion euro for programmes in education and culture between 2007 and 2013 (Holmes and Gardner, 2006). The UK and the United States have also invested huge amount of money for all aspects of the technology and its integration. Barack Obama allocated 500 million dollars for online courses and materials in 2009 (Writers, 2010).

The first attempts to introduce new media in educational context since the beginning of XX century until the late 1980s did not have much success (Bates, 1986; Cabrero, 1998). Reiser (2001: 61), in his historical analysis about the evolution of media and technology in the United States context, affirmed: "As a new media enters the educational scene, there is a great **deal** of initial interest and much enthusiasm about the effects it is likely to have on instructional practices. However, enthusiasm and interest eventually fade, and an examination reveals that the medium has had a minimal impact on such practices". This evolution seems to be similar in all countries and for both public education and business training. A OECD report from 2001 highlighted the difficulties to implement ICT in education: "In spite of having spent US$ 16 billion in 1999 in OECD countries in ICT, there is (...) no clear evidence that ICT investments made by public sector have resulted in improvement performance of teachers and/or learners, nor that it has improved the quality and access to educational resources on the scale predicted" (OECD, 2001: 24). Even though, the impact of the use of ICT is not that high as initially predicted, e-learning still records high rates of adoption and ICT will be used for a longer time than the precedent media (Reiser, 2001).

A survey conducted by OECD in 2004 among 18 universities worldwide showed the evolution of the weight of the online presence between 2000 and 2004 at those institutions. Next table (table 1) shows the results of this survey:

Table 1. Weighted online presence at 18 higher education institutions 2000/2004

Institution[1]	Type	2000/01	%change	2003/04	%change	2006/07
Multimedia Kontor Hamburg	C	102	7%	109	28%	140
Zurich University	C	102	20%	122.2	26%	154%
Kyoto University	C	110	26%	139	22%	169
University of Sao Paulo	C	120	46%	175	11%	195
Carnegie Mellon University	C	118	44%	169,5	16%	197
Aoyama Gakuin University	C	135	15%	155	29%	200
Asian Institute of Technology	C	104	10%	114	78%	203
University of California, Irvine	C	150	42%	213	29%	275
University of Paris Nanterre	C	200	19%	238	18%	280
Monash University	C	171.5	21%	207	38%	285
University of British Columbia	C	154	40%	215	41%	313
FernUniversitär Hagen	D	190	32%	250	28%	320
UK Open University	D	230	20%	276	18%	325
UCLA Extension	D	136	51%	206	71%	352.5
Open Polytechnic New Zeeland	D	190	47%	280	36%	280
University of South Australia	M	250	30%	325	20%	390
Vitual University of Tec de Monterrey[2]	D	50	550%	325	54%	500
Open University Catalunya	D	500	0%	500	0%	500

Note: C = Campus based; D = Distance learning; M = mixed

1. Ordered by 2006/07 score
2. The weight sources for the Virtual University Tec de Monterrey for 2000/01 and 2003/04 are artificially low due to uncertainty about the nature of satellite delivery.

Source: OECD (2005).

Student enrolments and online courses offered by higher education institutions have continually increasing since then. Annual growth rates of online education in United States reveal this trend of e-learning adoption. The number of student taking at least one online course in US grew from 1.602.970 enrolments in 2002 to 7.126.549 enrolments in 2012 (Figure 2). Figure 3 shows the evolution from 2002 to 2012 of the online offerings in US's higher education institutions.

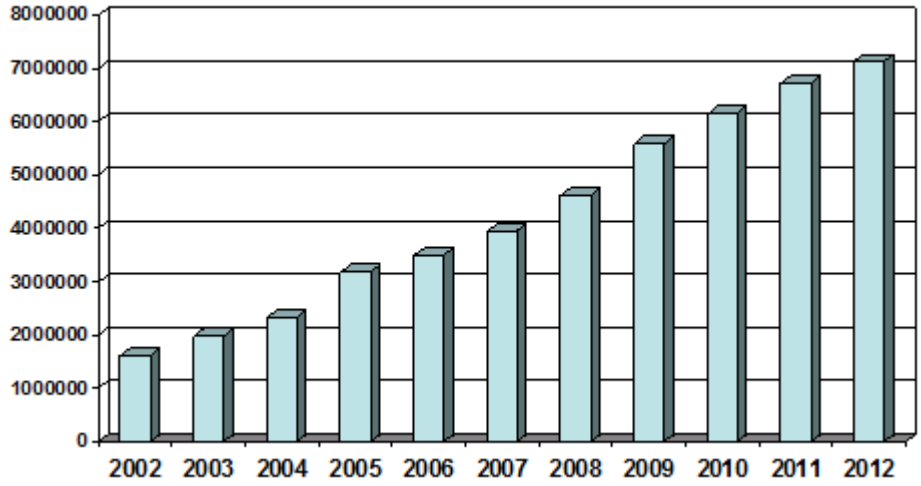

Figure 2. Students' online enrolments in US. (Own elaborated from Grade Change, 2014)

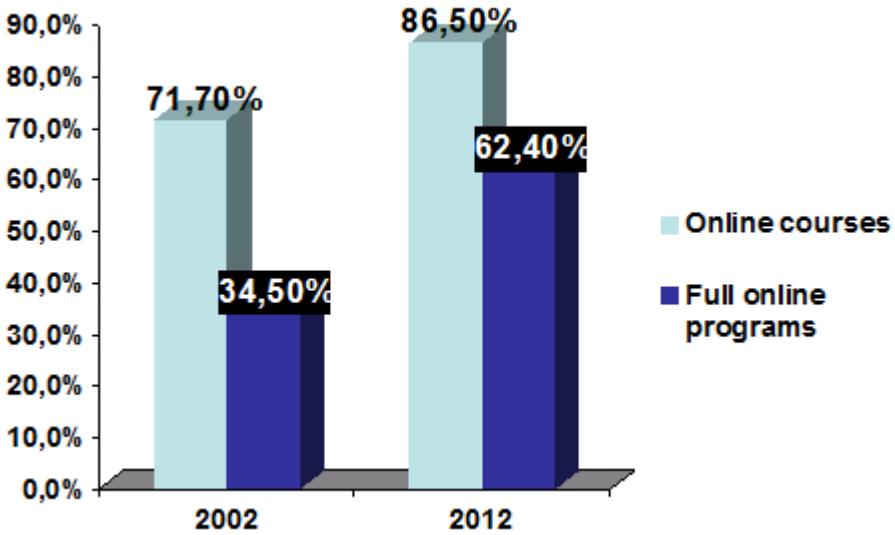

Figure 3. Evolution of online offerings in higher education instutions in US. (Own elaborated from Allen and Seaman, 2013)

But e-learning not only has continued to grow in US. Europe is catching up US in number of student enrolments and e-learning courses. In 2012, there were about 500 European institutes offering short online courses and full online programs (StudyPortals, 2012). In 2011, student enrolment increased 15-20% while the offer grew with 40%.

E-learning is also being introduced in schools and in PreK-12 education, in general. In US there are over 1.5 million K-12 learners taking online courses every year (Sloan Consortium, 2013). The European VISCED project found that virtual schools are found in every continent in the world, especially in US, Canada, Latin America, Australia and New Zeeland (Bacsich et al., 2010b). The VISCED project also indentified virtual schools in several countries from Asia, including Japan and Korea, and 70 virtual schools in Europe.

It may not be clear which is the start point of e-Learning in the history, but each media, technology or public investment in this field has contributed to ICT' current uses in education and training. Next infographic shows important events, selected from the literature (Reiser, 2001; Cross, 2004; Bacsich et al., 2010; Writers, 2010, Allen and Seaman, 2013) that have marked the development of e-learning:

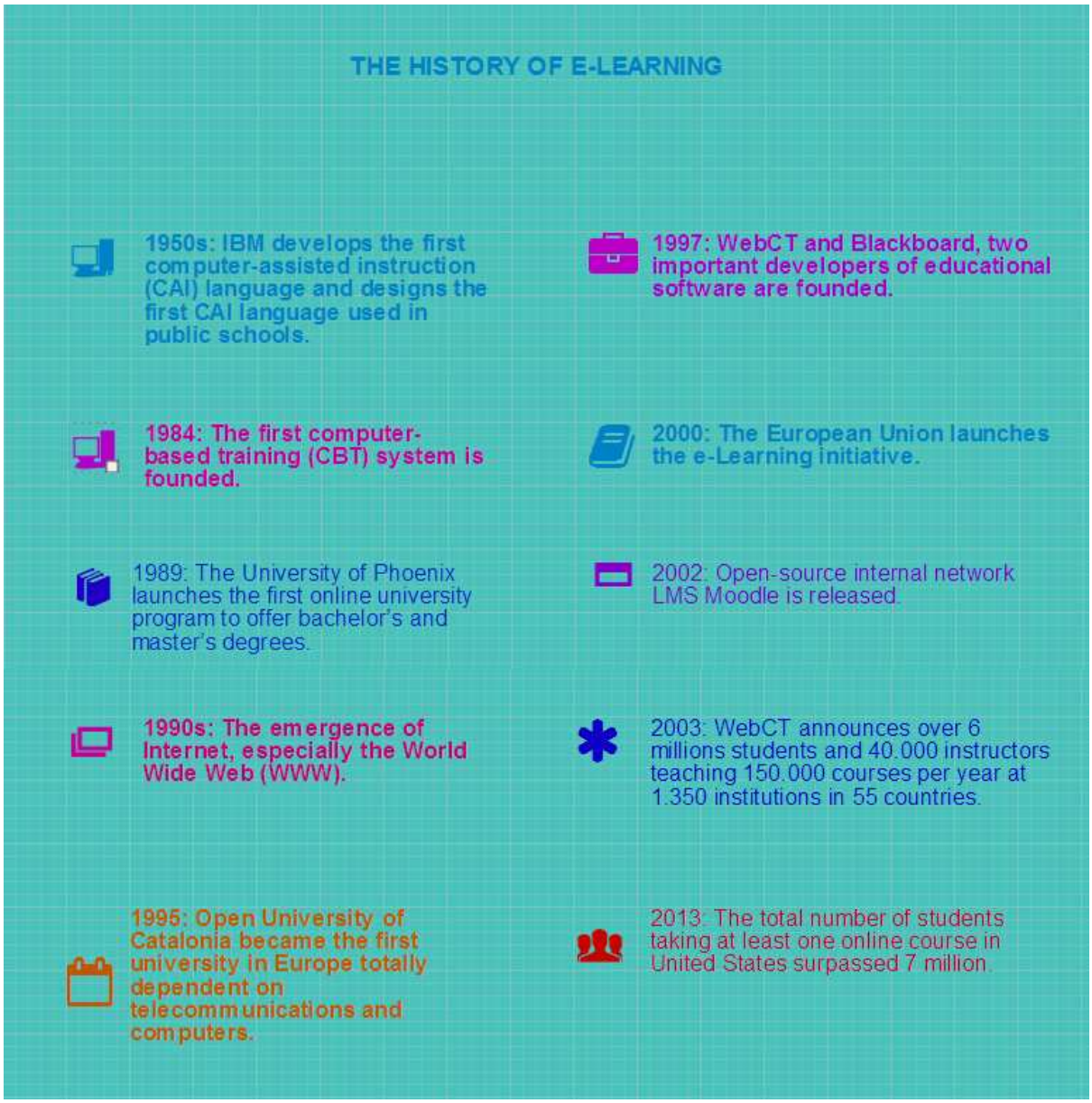

Figure 4. The history of e-learning (own elaborated, 2014).

1.3 The e-Learning Market

The e-learning market is a very complex world with a diverse list of learning and technology providers. The actors in the market cover a large area of education and training activities, from learning design, development and administration, to delivery and assessment. Traditional universities, distance education providers and other public institutions are important players in the market. But the educational market, which was previously controlled almost exclusively by the state, is systematically invaded by e-learning companies (Schnekenberg, 2004) and other types of private institutions, such as

corporate universities (Simpsons, 2012). Technology providers, telecoms and other content services suppliers are also important players in the e-learning market (Ambient Insight, 2014).

The adoption of learning technologies varies dramatically from country to country, as each country has its own educational system. The global economic crisis has led to important cuts in public budgets for education and training all over the world (Ambient Insight, 2014). But, public administrations still support e-learning projects, in order to increase efficiency in education (Schneckenberg, 2004; European Commission, 2013). The overall global corporate market has also been negatively impacted by the recession (Ambient Insight, 2014).

North America is the most mature e-learning market in the world. In 2011, North America accounted for 61,7% of the total market and by 2016 its revenue will reach $27,2 billion (Ambient Insight, 2012a). In Western Europe, e-learning market registered a an annual growth rate of 5,8% in 2011 and by 2016 its revenues will reach $8,1 billion (Ambient Insight, 2012b). Ambient Insight (2012c,d,e,f, 2013) also estimates important growth rates of e-learning market in Eastern Europe, Asia, Latin America, Middle East and Africa.

E-learning is continually evolving and the types of players and the structure of the value chain is still being built (Massy, 2004). Figure 5 shows the complex structure of the e-learning market.

The e-learning market demonstrates a high degree of complexity (Martínez Caro, 2006) and it is difficult to classify. However, we can distinguish three types of demand, companies, academic sector and public administrations and organizational buyers. While, e-learning providers can be classified according to their specialization in three segments: content, technology or services providers.

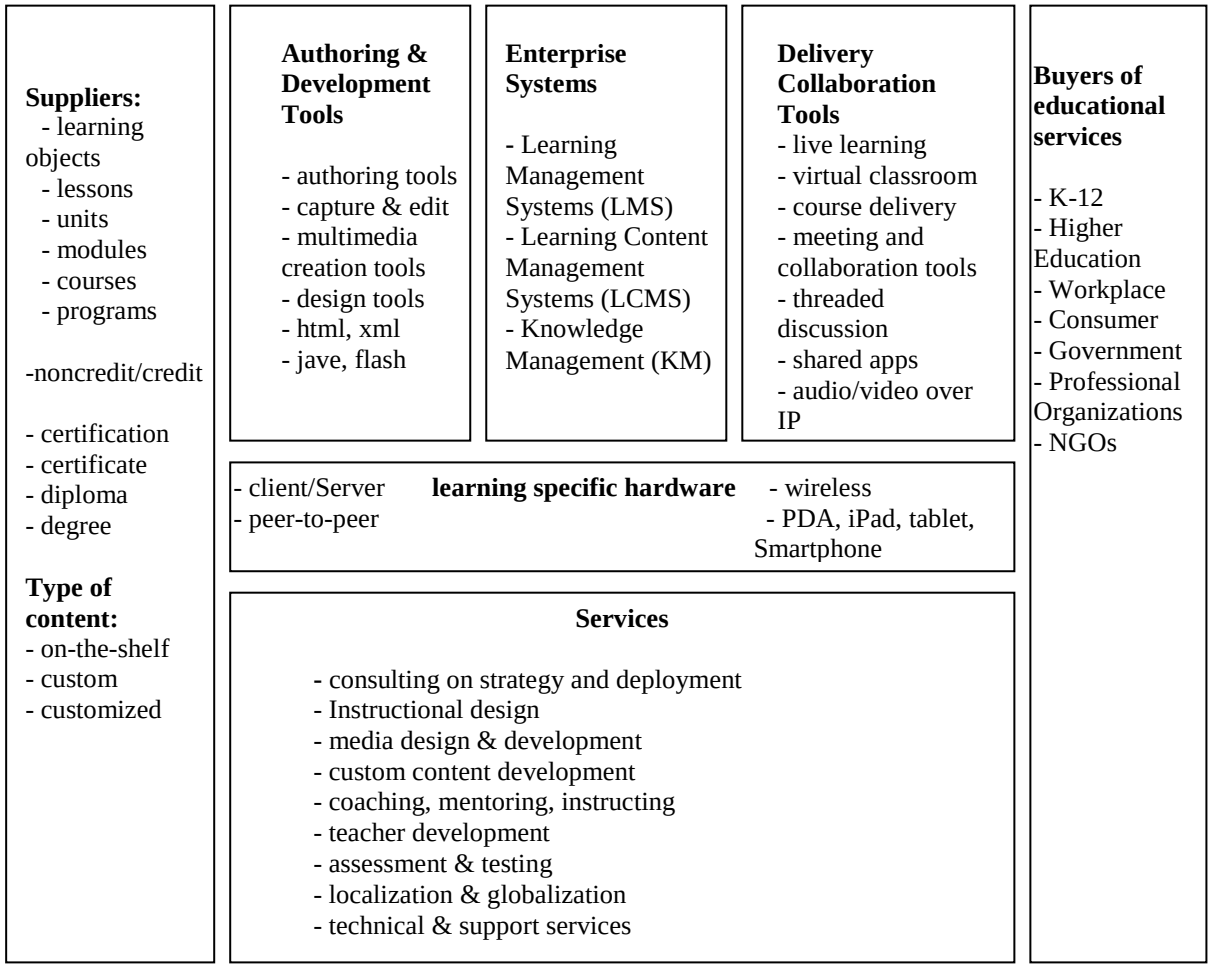

Figure 5. The structure of e-learning market (adapted from Stacey, 2002)

1.3.1 The Demand

The massive adoption of digital learning products (open and commercial combined) on a global scale is driving high demand for services (Ambient Insight, 2012g). There are mainly three types of demand: academic sector, public administrations and companies (Martínez Caro, 2006).

High Education is one of the fields where e-learning has experienced a greater initial growth (Martínez Caro, 2006) and students enrolments had increased in the last years. In the fall 2012, the students taking at least one online course reached the total number of 7.1 millions, at an annual growth rate of 6.1% (Grade Change, 2014). This growth rate represents the lowest percentage since the Grade Change report begun to register online enrolments in 2003. But the online enrolments of students increased in other parts of the world too. By September 2012, 44% of the 8.2 million post-secondary and tertiary students in the Russian Federation took one or more online classes every year (Ambient

Insight, 2012c). In 2006, the Open University of China had over 2.7 millions of students (Bacsich et al., 2010a) and the University of South Africa has 310.000 students (Ambient Insight, 2013). In Europe, in 2006, 20% of Internet users declared to have benefit from some sort of formal educational activity through the Internet in the UK, Turkey, Greece, Hungary and Netherlands (Pedró, 2012). In the UK, there are approximately six English universities with an important e-learning activity (Bacsich et al. 2010a). The most famous, UK Open University has over 250.000 students (Simpsons, 2012).

The important recognition given to lifelong learning is creating demand for professional development courses and resources (Casado González, 2001; Massy, 2004). Providers of Vocational Education and Training are receiving public funding in some European countries, such as Germany. Public sector investment in workplace learning has increasingly included e-learning in the last years, local governments, the healthcare sector and defence being some of the most important users of workplace learning (Massy, 2004).

Big companies have been the first to adopt e-learning, with the purpose of saving economic costs and time (Martínez Caro, 2006) as a consequence of globalization, the relocation of professionals and the rapid obsolescence of knowledge (Casado González, 2001). In 2006, 25% of enterprises in the OECD were using e-learning applications for both employee and training (Pedró, 2012). Only, in Spain, the use of e-learning in companies has doubled from 2005 to 2010, reaching a percentage of 45% (élogos, 2011). But, the economic crisis has impacted the e-learning demand of corporation and business. Large companies, especially in the US, are reducing their expenditures on training and education products (Ambient Insight, 2014). Contrary to the trend in large companies, small and medium-size businesses (SMB) are migrating from classroom products to learning technologies. There are also markets, where the demand for e-learning in corporations is low, such as Japan, France and Germany.

Associations, non-profits and non-government organizations (NGOs) are both direct and indirect clients. They buy learning technologies for their memberships and offer e-learning training for their workers and volunteers. UNESCO, The World Bank, The European Social Fund, and Commonwealth of Learning are examples of organizations that are financing e-learning initiatives around the world (Ambient Insight, 2014).

The behaviour of the three types of customers is not the same and it is differently affected by economic cycles. Usually, highest levels of traded activities and technologies, content and services in e-learning occur in corporate learning, but public policies and funding instruments have stimulated the demand for e-learning products and services (Massy, 2004) in all segments.

1.3.2. The E-learning Offer

The offer is characterized by dispersion and heterogeneity (Martínez Caro, 2006): universities, training centres, ICT companies, consultants, telecoms, etc. However, the offer can be classified in three types of e-learning providers, according to their specialization: content, technology or services. But, sometimes, their role in the market is not clear and some of them are involved in a wide range of activities.

E-learning content providers

The economic context, characterized by the global economic recession and globalization, has led to changes in the commercialization of public universities (Schneckenberg, 2004). Public funding spent on education has been reduced all over the world and public administrations are focusing more on efficiency and on the return of their investments (Massy, 2004). Internet, the increasing use of ICT in education and globalization are increasing the competition between institutions (Simpsons, 2012). This context has determinate many traditional institutions to adopt e-learning, in order to attract a larger number of students and to generate revenues (Schneckenberg, 2004: Massey, 2004).

By 2004, the majority of universities were offering e-learning courses (PLS Ramboll Management, 2004). But the approaches to e-learning depend on the national market orientation. In the US the market-orientation of education is more advanced as in Europe (Schneckenberg, 2004). But, even in Europe there are differences. For example, the U.K., that has a stronger tradition of exporting education, has a more market-oriented approach to e-learning than other European countries (PLS Ramboll Management, 2004). Also, countries that were previously net importers of education, such as Malaysia and China, are now becoming exporters of education (Simpsons, 2012). Higher education institutions are also beginning to provide continuing professional development online resources (Massy, 2004).

One trend around the globe is the creation of national virtual universities (Ambient Insight, 2014). Finland, Sweden, Norway, Bulgaria, Estonia, Malaysia, Tunisia, the Philippines, Mexico, Uganda, Australia, Kenya, Pakistan and Switzerland have national virtual universities funded by the government. But, there are also emerging pan-regional virtual universities, such as ASEAN Cyber University, UNISA and the African Virtual University. *Virtual university* is a term used to describe different types of universities that offer their courses in e-learning format (PLS Ramboll Management, 2004).

Some of the institutions have now global reach, with international student enrolments (Simpsons, 2012; Ambient Insight, 2014) such as the UK's Open University and India's Indira Gandhi Open

University. In Both the US and Australia, education is already a major export article and it seems that this trend is also increasing in Europe (PLS Ramboll Management, 2004).

Another trend emerging in education is the development of Open Education Resources[5] (OER) and Massive Open Online Courses[6] (MOOCs), through which institutions make their course materials free available on the web (Simpsons, 2012). In the US, the three main providers of MOOCs offer around 400 courses, with 3 million users worldwide, while in Europe this type of educational supply is poorly developed (European Commission, 2013). In Europe, there is evidence of about 378 MOOC courses (SIE, 2013) with Spain leading the top of countries offering this type of courses (Figure 6).

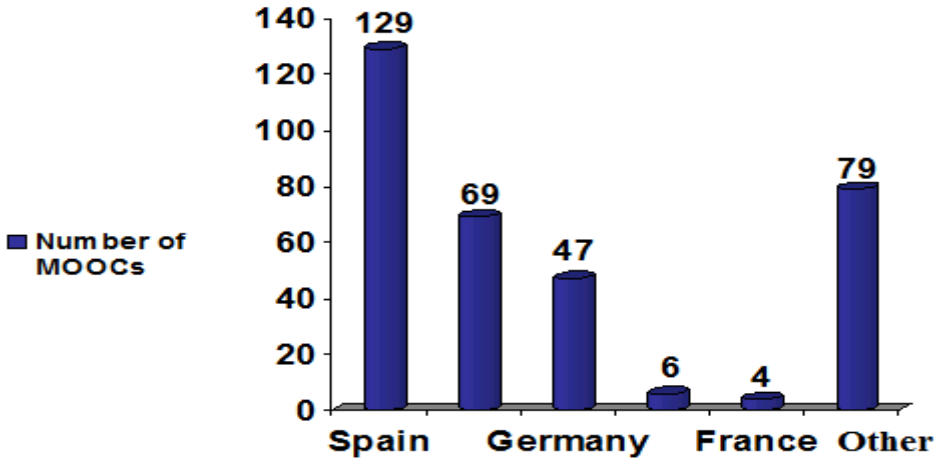

Figure 6. Number of MOOCs in Europe (own elaborated from SIE, 2013).

Education has become an attractive market for private investments. More and more e-learning companies enter the market expecting significant benefits (Schneckenberg, 2004). Commercial interests in higher education have even received strong support in the World Trade Organization (WTO) and a number of countries agreed to reduce obstacles to international trade in higher education (WTO, 2010). In the US there are an important number of private providers on online course and they are quite profitable (Bacsich et al., 2010a). And the creation of corporate universities, such as the "Coca-Cola University", is the fastest growing sector of higher education in US (Simpsons, 2012).

Collaborative models between public institutions and between public institutions and private companies (Area, 2004) are emerging. Examples of this type of collaborations are the one that exist between Spanish universities, such as UNED, UOC and ITESM with universities and agencies of

[5] OER are “digitised materials offered freely and openly for educators, students and self learners to use and reuse for teaching learning and research” (OECD, 2007). MIT OpenCourseWare project is an example of learning projects using OER. A more detailed definition of OER can be found in the Glossary page 103.

[6] MOOC is a type of online course aimed at large-scale participation and open access via the web (ASTD). Coursera edX and Code Academy are examples of MOOCs. See the Glossary page 102 for a more complete definition.

South America (Bacsich et al., 2010a) and the collaboration between Universitat Politècnica of Catalonia and élogos in innovation and e-learning design (élogos, 2011). Collaborative models between traditional universities and foreign universities or private companies to offer online courses are also becoming popular in China (Bacsich et al., 2010). In US, private online course providers are supporting the activity of traditional universities.

In higher education e-learning resources are produced either internally or provided by publishers (Massy, 2004) But often, universities and training centres are present in many corporate e-learning initiatives and as content developers (Martínez Caro, 2006). For example, Open University of Catalonia (UOC) focuses on developing course material professionally to share them with its partner universities or sell them to other universities (PLS Ramboll Management, 2004). Many partnerships have been created to ensure the quality of the content and access. Some publishers have partnered with higher education institutions to provide a platform integrated with content (Massy, 2004), such as Edinburgh Business School, Pearson and Blackboard, McGraw Hill and Blackboard. They have also partnered with telecommunication companies to sell learning content. This is the case of Mobiledu, a joint venture between Pearson and Nokia in China, with over 1.5 millions active users access content from the BBC, Wall Street English, British Council, ETS and Pearson (Ambient Insight, 2012). Large publishers play an important role as content developers and suppliers but, there are also minor digital suppliers working in specific subject domains (Massy, 2004).

Technology suppliers

Although content is the main component of any educational or training activity, e-learning could not take place without the technology that provides the necessary infrastructure so that content can get to the end users. The e-learning market is very fragmented and includes companies that offer a large variety of products (Wilson et al., 2000; Martínez Caro, 2006, Ambient Insight, 2014): authoring tools and web editing, collaboration software, content management and distribution software, computing devices, cloud-based platforms, interactive hardware, audio and video technology, simulation and gaming tools and other useful technologies.

An analysis of the education-related patents over the past 20 years shows a clear rise in the production of highly innovative educational technologies by businesses (OECD, 2012). And the in-depth analysis of the top 50 companies specialised companies in patenting educational tools revealed that these specialised firms operate mainly in tertiary education, followed by corporate training (Foray and Raffo, 2012). Next figure (Figure 7) shows the results of this analysis.

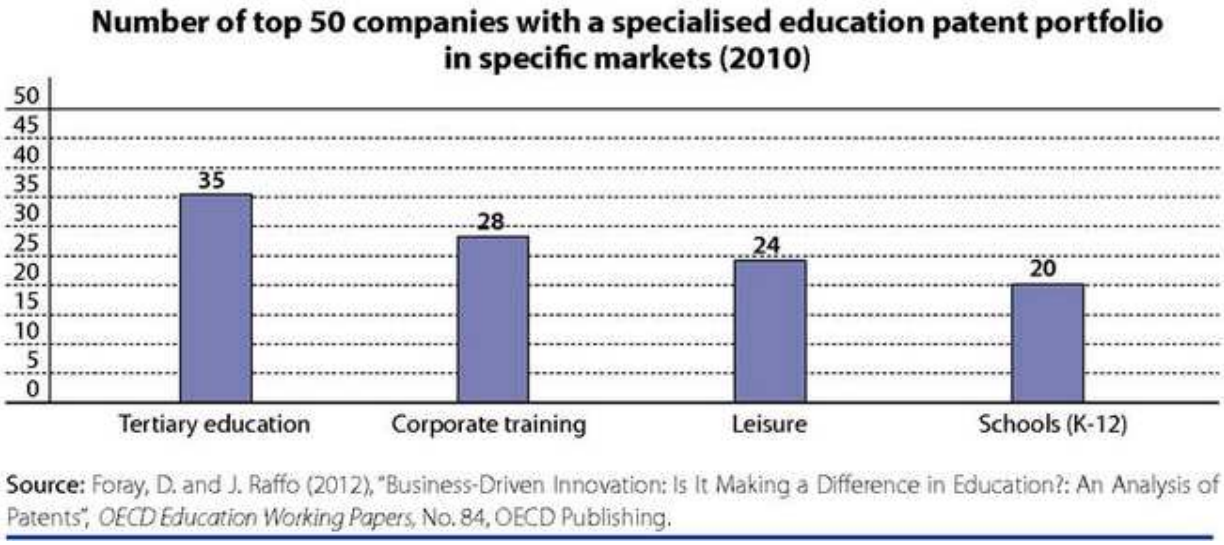

Figure 7. Analysis of the top 50 companies specialised education patent portfolio (OECD, 2012).

Of all these products, the so called *Learning Systems* or *Learning Platforms* stand out. They allow the integration of different technologies to support the learning process. The British Educational Communications and Technology Agency, the leading agency for the development and implementation of ICT in education in UK, has coined the term *Learning Platform* to describe the set of hardware, software and support services organized to "enable" effective ways of working inside and outside the classroom (Area and Segura, 2009). Other terms are often used in the literature, such as *Course Management System* (CMS), *Learning Management System* (LMS), *Learning Content Management System* (LCMS), *Virtual Learning Environment* (VLE) or *Managed Learning Environment* (MLE). In the US, CMS, LMS and LCMS terms are used, while in Europe the most common terms are VLE and MLE (Area and Segura, 2009). Even though, each term is used to designate different educational computer applications (Martínez Caro, 2006; Massy, 2004; Area and Segura, 2009), they are sometimes confused with each other (Watson, 2007).

Coll and Monereo (2008) offer the same definition for LMS and VLE, defining them as software applications on a server connected to a computer network, Internet or Intranet, specifically designed to facilitate access to learning materials and communication between students and teachers and among students themselves. Massy (2004), in his study of the e-learning suppliers market in Europe for the European Commission, says that LMS and LCMS are technologies associated with the workplace learning, while VLE and MLE are terms generally used in Higher Education. In this study, VLE is defined as a virtual environment accessed by learners and teachers to access or post information, learning resources and communication tools and activities, while a MLE further includes registration, assessment, administrative and other processing applications. Watson (2007) explains the differences between LMS and other two terms often used, CMS and LCMS. While a CMS is focused on the management of courses, the LMS is used to support the learning process of an entire organization and

the focus of LCMS is the content. LCMS is defined as a system used to create, store, assemble and deliver personalized e-learning content in the form of learning objects (Brennan et al., 2001).

Although most of the market leaders were developed within universities, few were able to grow outside the boundaries of their institutions (Massy, 2004). WebCT and Blackboard offer the most known systems in the market. Though expensive, these commercial systems are the leaders in the market, especially in university online course delivery and offer sophisticated authoring tools, ease of navigation and robust operation (Holmes and Gardner, 2006). Blackboard has carried out merges and acquisitions to maintain its position as leader market, such as the merge with WebCT in 2006 and the acquisition of ANGEL Learning in 2009. Besides these systems commonly used by universities from US and Europe, other platforms, such as, First Class in UK, Top Class in Ireland or other custom-designed are used (PLS Ramboll, 2004, Martínez Caro, 2006).

Important IT companies, such as IBM, ORACLE, SAP, SumTotal and Saba offer L(C)MS and enterprise suite, that are mainly addressing the needs of large organizations (Massy, 2004). In the market, there are also companies specialized in live e-learning platforms like Citrix Systems, Webex, Centra and Interwise.

In the last years, open source systems, such as Claroline, Sakai and Moodle, have gained popularity as they offer low-cost or free alternatives, which can be easily adapted to the needs of users (Holmes and Gardner, 2006; Coll and Monereo, 2008). The best-known open source system is Moodle (Massy, 2004). A review of the Moodle web site[7] reveals its wide adoption around the world: more then 64.000 registered sites in 235 countries, more than 7 millions courses delivered and more than 71 million users. US, Spain and Brazil are the three top in terms of Moodle registrations.

The systems mentioned above are considered to be installed platforms (Ambient Insight, 2014). But the market is full of other types of services, such as cloud based platforms, personal learning devices, simulation and gaming technologies and mobile applications. Cloud based authoring tools and platforms show high rates of growth in almost all regions of the world (Ambient Insight, 2012 a,b,c,d). Simulation technology is often used when it is very costly to make mistakes, such as training pilots and doctors, and it has experienced an important growth in the US market (Massy, 2004). Some of the most sophisticated learning technologies are found in the healthcare sector, including simulation technology and mobile learning products (Ambient Insight, 2014). An example where simulation technologies are used in learning is the electronic Basic Surgical Training System (BeST), a partnership between Royal College of Surgeons Ireland and Harvard Medical School (Holmes and Gardner, 2006). Companies, such as Pan Vision in Sweden and EPIC in UK are producing game-

[7] The latest data can be consulted on the statistic page of Moodle's website https://moodle.org/stats/ .

based e-learning for companies, organisations and consumers (Massy, 2004). Personal learning devices are specially used in Asia, but they are also growing in other parts of the world. It is estimated that by 2016, over 300 millions schoolchildren across the planet will be using personal learning devices (Ambient Insight, 2014). The use of mobile learning technologies is also increasing. In US, personal digital agendas (PDAs) have been used in schools and for workers with positive results in terms of learning effectiveness, while in Europe, Nokia and Vodafone have already integrated mobile learning into their training and development systems (Massy, 2004). In Middle East, there is high demand for language learning applications (Ambient Insight, 2012f).

Other services suppliers

Service suppliers offer a large variety of products: learning portals, application service providers (ASP), mobile learning value services (VAS) and other services.

Learning portals are an alternative for companies and universities. Companies are using them to provide their employees and clients with a range of training and information services (Martínez Caro, 2006). They also outsource the production and distribution of educational offer of universities. (Schneckenberg, 2004). The outsourcing of higher education activities it is also called Education Portal Industry.

An *application service provider* (ASP) is a company that gives to its clients the possibility to use software applications using a rental model or a periodic payment (Martínez Caro, 2006).

Telecommunication companies sell now commercial learning products all over the world. They sell subscriptions to web-based learning platforms to schools and mobile learning VAS subscriptions directly to consumers (Ambient Insight, 2012). The operators initially developed their mobile learning products in emerging economies, where the penetration of mobile devices is higher than PC penetration, and are now expanding into developed economies (Ambient Insight, 2014). The integration of mobile devices, such as laptops, PDAs and smartphones, in the e-learning process has led to the emergence of a new term, *mobile learning* or *m-learning*. O'Malley et al. (2003: 6) define mobile learning as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies".

The e-learning market includes also other professional services, such as: consulting, integrators and web hosts, network providers, testing, assessment services and accreditation agencies.

1.4 Advantages and Disadvantages of e-Learning. Cost and Benefits

The spread of Internet access both at home and at the workplace together with the continuous improvement of e-learning products and services and emerging technologies that facilitate the compatibility and usability of such products (Casado González, 2001), make e-learning an increasingly attractive option for companies, organizations and educational institutions. E-learning is seen as a form of education and training that can reduce costs, improve quality and efficiency and increase access to education (Area, 2005; European Commission, 2013). But, e-learning also have other numerous advantages that can benefit companies, profit or non-profit organizations and educational institutions. Next table (table2) summarizes these advantages:

Table 2. E-learning advantages for companies, organizations, universities and learners. (own elaborated from Khan, 1997; Casado González, 2001; Martínez Caro, 2006)

Advantages for companies and organizations	Advantages for universities	Advantages for learners
- It provides the opportunity to give training to a large network of professionals who can be spread all over the world. - It gives the capacity to provide training in a decentralized manner, even in the same workplace: each worker can take courses independently and at their own pace. - It allows the standardization of training content and ease of upgrade. - It facilitates the spread on a large scale training strategies before applicable only to smaller groups. - It reduces costs and training times regarding traditional training. - It creates usage habits of new technologies that are applicable later in the daily work.	- It allows universities to extend high education to social groups that for various reasons can not access the classroom. - Faculty members can easily update course materials, provide guidance and support, both synchronously and asynchronously, without being confined to a classroom and office hours. - Universities can administer student's enrolment, tuition and course grade via Internet, minimizing operational and employment costs. - Can help universities to compete in an increasingly globalized educational market.	- E-learning makes education and training available to different social groups regardless of their location, age, ethnicity, gender, language, physical limitations, etc. - It expands the boundaries of learning. The learner can access the content anytime, from anyplace, from different electronic devices and equipments. Availability of content 24 hours a day, 7 days a week. - An increase access to a wide range of education and training offer, as geographical barriers are overcame. - Personalized learning (contents, pace of learning, customized tuition). - Increase interaction with colleagues and teacher. Possibility to communicate both synchronously and asynchronously.

But not all are advantages. E-learning also presents some inconveniences, generally regarding the technological development, human and organizational factors and ethical issues.

Internet as the primary mean of transmission of the information presents its own technical problems. The main problem regarding Internet is that the level of broadband availability is unequal. There are important differences between continents, regions and countries, and there are still people in the world that do not have home access to Internet (Simpsons, 2012). The level of broadband availability is a problem especially where media rich and processing demands are high for resources such as simulation (Massy, 2004) and live transmissions.

There are also other inconveniences regarding technology in e-learning. There are issues regarding technology maintenance and replacement/upgrading, as public and private funding do not always cover these requirements (Massy, 2004). The level of digital literacy[8] for both learner and teacher can be an impediment for the e-learning process.

It is estimated that e-learning leads to cost saving of 40%-60% compared to traditional teaching, both direct (own training cost) and indirect (travel, meals, working hours, etc.) (Martínez Caro. 2006). But, many researches and consultants affirm that e-learning is not a cheap solution (Massy, 2004). It is true that with e-learning some operational costs are saved, but it also adds other costs, such as investments for the acquisition of technologies, maintenance and upgrade and additionally training for employees to use these new technologies.

Especially high education institutions argue that developing ICT-supported material and e-learning content is very costly (Massy, 2004) and teachers think that online courses are more time consuming than campus courses (Mason and Rennie, 2006).

There is the belief that e-learning is characterized by the lack of human contact between students and teachers. The continuous improvement of communication technologies has led to an increase of interaction between the participants in the e-learning process. Videoconferencing tools have reduced the lack of non-verbal communication. Also, a virtual environment can increase the participation of learners with personal inhibition (Romiszowski, 1997). But this interaction may lack the advantages of interpersonal and nonverbal communication and may not be as spontaneous as in a classroom. In a face-to-face interaction communication is more spontaneous and free fowling, without the distraction of manipulating switches, anticipating technical difficulties, or relying on electronic devices or technical equipment for teacher-student communication and feedback (Willis and Dickinson, 1997).

[8] The American Library Association's Digital Literacy Task Force defines digital literacy as the ability to use information and communication technology to find, evaluate, create and communicate information (Horizon Report, 2014).

Students also can not develop social competencies (Schneckenber, 2004), as they do not have access to the social life and activities of a traditional campus.

Also, ethical issues arise in this form of education and training. The most discussed is the intellectual property of the course content (Massy, 2004), as in Internet content is easy to replicate and share. Another issue is the difficulty of knowing if the student who carries out an online assignment is the one who is eventually accredited (Mason and Rennie, 2006).

CHAPTER 2: QUALITY IN E-LEARNING

2.1. The Concept of Quality

2.2. The Importance of Quality in e-Learning

2.3. Factors Affecting Quality in e-Learning

2.3.1. Technology

2.3.2. Organizational Factors

2.3.3. Other Factors

2. QUALITY IN E-LEARNING

2.1 The Concept of Quality

Quality is a concept difficult to define and it has various meanings. The word *quality* comes from the Latin *qualis* meaning *what kind of* (Salis, 2002).

In conventional definitions of quality, the concept emphasized inherent characteristics and attributes that were established by professionals of an organization or an industry (Ruben, 1995). But modern definitions of quality focus on customer needs and expectations (Martinez Caro, 2006). For Shewart (1997), instead, quality has two dimensions, a subjective dimension (what customer wants) and an objective dimension (the properties of the product or service, regardless the expectations of customers).

Juran and Gryna (1997) define educational institutions as an industry that provides a basic service, education. Educational institutions begin with a raw material (students), apply a process (teaching) and get a graduate, though some failures may exist. There are some specifications for the raw material (minimum requirements for admission to a particular training program). Also, there are specifications about the process (program and course methodology), process controls (work papers, presentations, exercises, texts) and a final text of the product (final exam) (Martínez Caro, 2006). This definition is based on the first concept of quality as meeting the requirements previously established by institutions.

But this product or service-based notion is difficult to translate to education, as education has many stakeholders. Not taking into account the expectations of students implies for education institutions the risk to lose students for one of their competitors. Also, the education and training institutions that ignore the expectations of those who pay for the service (governments, companies, parents) put in risk their accountability and, therefore, their survival.

The definition of quality as "meeting customer requirements" raises questions about who are the customers of education, those who invests in education or those who benefits from it (Harvey and Knight, 1996).

Moonen (1997) says that education is a productive activity, but considering that its results are outputs, which are the immediate and direct effects of education, such as skills development, attitude and behavioural changes, etc.; and also outcomes, which are the result of the interaction between outputs and the social environment, such as student satisfaction.

Harvey and Knight (1996) affirm that education is not a production process, it is a participative process. In their view students are participants (not products, consumers, service users or clients) and education is an ongoing process of transformation of the participant.

All these definitions highlight the complexity of the concept of quality. One person's idea of quality often conflicts with another, and even experts never came to the same conclusion when discussing about what makes a good education or training (Sallis, 2002). Quality is not a fixed characteristic belonging to subjects or systems, it is the result between learning (seen as the result, a process or an education system) and the demands, goals, standards (regulations) and requirements set by individuals, businesses, organizations, local community, governments and society (Rubin, 2010). Therefore, when defining quality it must be taken into account its tangible and intangible dimensions, together with the context and situation considering the perspective of stakeholders involved (Stracke, 2013; Ehlers, 2012).

2.2 The Importance of Quality In e-Learning

The increase use of ICT in teaching and learning, globalization and the economic crisis are putting pressure on educational institutions and businesses. Globalisation has led to the internalisation of educational programmes for both higher education and workplace training. E-learning and the appearance of phenomena as Massive Open Online Courses (MOOCS) and Open Educational Resources (OER) are increasing the competition (Simpsons, 2012; European Commission, 2013). At the same time, the economic crisis is putting pressure on governments and companies to reduce their expenditures on education and training (Ambient Insight, 2014) and to better justify their investments (Massy, 2004). In this context, the viability of educational institutions and businesses can be under threat. As quality may be sometimes the only differentiating factor for an institution (Sallis, 2002), the interest for quality improvement in educational institutions and businesses is increasing. High quality is the main issue examined by modern scholars and practitioners from the international education market and has become the main competitiveness indicator for education (Rubin, 2010).

In addition to the challenges that education must face today, e-learning must also cope with high dropout rates (Zaharias, 2005; Simpsons, 2012) and with it an image of offering a lower quality in comparison with conventional education (Ehlers, 2012). Because of these challenges and the wide spread of ICT-learning all over the world, assuring quality in e-learning has become a critical issue.

There are different approaches to quality in e-learning across the globe, depending on educational systems and traditions. But, generally, there are mainly three approaches to quality in education: accreditation, assessment and audit. Both accreditation and assessment monitor the quality of teaching

and learning, while audit focuses on internal procedures created by institutions in order to achieve their objectives (Kis, 2005).

Influential quality standards have been introduced in recent years to promote quality and excellence in education. Accreditation is a common used method in quality assurance in OECD countries (Kis, 2005) and it is a method used for the accreditation of programmes and institutions. Governments have always played an important role in the quality assurance of education, especially in European countries, but also in United States, Japan or Australia (Kis, 2005) with differences. Different Public Authorities have established quality assurance systems in e-learning (Dondi and Moretti, 2007), with the exception of United States where accreditation is a voluntary process that is implemented by private and non-governmental evaluation agencies (Frydenberg, 2002).

The quality standards in education are based on approaches to quality outside the sector, such as the ISO 9001 Quality Management Standard and the Total Quality Management[9] (TQM) approach. ISO standard focuses on the optimization of a company activity. The optimization is focused on the improving of effectiveness, through a continual process improvement and tracking customer satisfaction. In addition, TQM requires the participation of all stakeholders in the improvement of customer satisfaction (Dondi and Moretti, 2007). The European Foundation for Quality in e-Learning (EFQUEL), established in 2005, is an example o the use of TQM practices in e-learning. Other important accreditation agencies and associations that have introduced standards for e-learning are: the Quality Assurance Agency (QAA) in the UK; Council for Higher Education and Accreditation (CHEA), Distance Learning and Education Council (DLEC), the Institute of Electrical and Electronics Engineers (IEEE) American Society for Training & Development (ASTD) and Sloan Consortium in US; Australian Computer Society (ACS); the International Association for Distance Learning (IADL) and U21G (a joint venture between Universitas 21[10] and Thomson Learning). In general, these agencies put emphasis on five components of e-learning experiences, such as the institutional context programme, the curriculum and the study programme, the support system to the student, the academic staff and the assessment system (Mena, 2007). Most of these agencies address the needs of higher education institutions, with some exceptions, such as the ASTD or Sloan Consortium, which also include evaluation services of quality for companies.

[9] "TQM is a management approach for an organization, centred on quality, based on the participation of all its members and aiming at long term-success through customer satisfaction, and benefits to all members of the organization and to society" (Dondi and Moretti, 2007, pp. 39).

[10] Universitas 21 (U21) is a network of 18 universities from four continents, which includes: McGill University, University of British Columbia, University of Virginia, University of Birmingham, University of Edinburgh, University of Glasgow, University of Nottingham, Lund University, Korea University, University of Melbourne, University of New South Wales, University of Queensland, University of Auckland, National University of Singapore, University of Hong Kong and Fudan University (Chua and Lam, 2007).

2.3 Factors Affecting Quality in e-Learning

Due to its high adoption rates in education, e-learning has been the subject of many studies and research that have tried to identify which factors are determinants for a successful e-learning. E-learning could not take place without the technology, therefore technology-related factors, such as factors affecting the acceptance and use of LMSs or other educational technologies and the impact of technology on e-learning success (Webster & Hackley, 1997; MCGill & Klobas, 2009; Naveh et al., 2010; Alsabawy, Cater-Steel and Soar, 2013) are important aspects to consider. The multiple dimensionalities of e-learning made necessary the investigation of those factors that can have an impact on the success and quality of e-learning, such as organizational factors (Soong et al, 2001; Arbaugh, 2002; Selim, 2007; Sun et al., 2008; Lee, 2010) and other factors related to e-learning (Govindsamy, 2002; Downey et al., 2005; Srite et al., 2008; Zaharias, 2008) .

2.3.1 Technology

The technology used in e-learning is rapidly changing (Grifoll et al., 2010) and there is a great diversity of technology on the market. This technological context, together with the investments made for the adoption of ICT in education and the possibility of e-learning products to be distributed worldwide have led quality agencies, institutions and researchers to take into account different factors when analyzing the impact of technology on e-learning quality and success.

One of the most discussed technological factors in the literature nowadays is access. This factor is considered to be one of the five pillars of quality in online education by Sloan Consortium (Lorenzo and Moore, 2002) and a critical success factor for e-learning by Selim (2007). The lack of an accessible and affordable technical infrastructure (Moore, 2002), low computer and digital media literacy and the compatibility and usability of hardware and software can become barriers for the access to e-learning for different groups of population around the world. In 2013, almost 40% of world's population had access to Internet (ITU, 2013), but there are high differences between regions. While in developed countries ICT is widespread at home, in education institutions and at work, the cost of Internet connection and computers and the lack of infrastructure continue to define e-learning experience of different groups of learners in developing countries (Gulati, 2008). And, as it is outlined by the OECD, connectivity is nowadays more important than the vast area of technologies, devices and gadgets (OECD, 2012). Even though the compatibility of e-learning products is increasing (Casado González, 2001), the spread of use of mobile devices and higher penetration of these devices in emerging economies compared to PC adoption (Ambient Insight, 2014) can create problems of access to learning content, objects and resources. Volery and Lord (2000), Selim (2007) and Alsabawy et al. (2013) found that ease of access and IT infrastructure are critical success factors in e-learning

and Soong et al. (2001) and Liaw et al. (2007a) have identified technical competency as a direct causal effect in the success of online course resources.

But the impact of technology itself and of LMSs on e-learning success has been also studied in several research papers (Webster and Hackley, 1997; Soong; 2001; Arbaugh, 2004; Selim, 2007; Sun et al. 2008; McGill and Klobas, 2009; Naveh et al., 2010; Alsawaby et al., 2013; Islam, 2013; Stantchev et al., 2014). A commonly used theory by these studies to identify technology acceptance and usage is the Technology Acceptance Model (Davis, 1989; Davis, Bagozzi and Warshaw, 1989). The essence of TAM is that an individual's intention to use a particular system is determinate by two factors: perceived usefulness and perceived ease of use. Davis (1989, p. 3) defines perceived usefulness as the "degree to which a person beliefs that using a particular system would enhance his or her job performance". In addition, he defines perceived ease of use as the extent to which a person beliefs that using a system will be free of effort. Many of this studies found that there is a relationship between TAM variables (Arbaugh, 2002; Arbaugh and Duray; 2002; Selim, 2007, Johnson et al., 2008; Islam; 2013) and learning outcomes. Additionally, Webster and Hackley (1997) and McGill and Globas (2009) found that task-technology fit has a positive effect on LMS use and on attitude to LMS use. Most of the mentioned studies include only the perspective of students on the use of technology in teaching and learning with some exception that also take into account the perceptions of teachers on the use of technology in teaching (Webster and Hackley, 1997; Soong et al., 2001; Hernández-Ramos et al., 2014; Schoonenboom, 2014).

The quality of technology and access is important, as frequent technical difficulties can discourage students from accepting e-learning products (Sunt et al. 2008). It is also important to take into account the attitude of learners and teachers about the technology used in the learning process, as several researches (Webster and Hackely, 1997; Selim; 2007; Sun et al., 2008) found that teacher's attitude towards technology in teaching and learning influence students satisfaction. Accreditation agencies in the sector have also developed standards to evaluate the quality of technology, such as the ASTD's E-Learning Certification Standards, the EFMD CEL Accreditation[11] and IADL's Standards for technology.

[11] The EFMD CEL Accreditation is given by EFMD in partnership with the Swiss Centre for Innovations in Learning (SCIL) at the University of St. Galen and Spirus Applied Learning Solutions AG (Dondi and Moretti, 2007).

2.3.2 **Organizational Factors**

Communication

Interactions between teachers and students play a decisive role in both face-to-face or distance learning activities. But in teaching and learning processes developed through e-learning, communication is an important dimension for quality, as without the interaction between the learner and the teacher, the virtual classroom is likely to become just a repository of content (Area and Segura, 2009). Learner-teacher interaction in e-learning can be defined as the ability of learners to communicate and receive feedback from their instructor (Swan, 2002).

A quality educational program requires high level of interaction between the student and the teacher or between students themselves (Anderson, 2003). In the case of e-learning, the interaction usually occurs via asynchronous or synchronous computer-mediated communication and, besides teaching communication that occurs during the educational process, may also include advising, offline communication and personal dialogue (Woods and Baker, 2004).

As, student-teacher interaction has the highest value amongst students (Anderson, 2003), it has been extensively studied in e-learning by several scholars (Arbaugh, 2000; Arbaugh and Benbunan-Fich, 2007, Sun et. al., 2008; Johnson et al., 2008; Vonderwell, 2008; Kuo et al. 2014). As we previously discussed in the first chapter (see section 1.4), interaction in e-learning has its limitations. The lack of body language and spontaneity may influence student learning and interaction, especially in asynchronous communication (Willis and Dickinson, 1997; Vonderwell, 2003). The limitations of technology-mediated communication may have as result misunderstandings and misinterpretations (Berge, 1997). Research findings indicate that learners with personal inhibitions tend to participate more in e-learning environments than in traditional environments (Romiszoszowki, 1997). On the contrary, students who are outgoing and verbally expressive might avoid writing or posting in online discussions (Palloff and Pratt, 1999).

In e-learning, it is considered that an effective communication depends on its frequency and timeliness (Swan, 2002). But, research findings are contradictory on this aspect. While Arbaugh (2002) and Vonderwell (2003) found that teacher's timely response significantly influence learner's satisfaction, in the study performed by Sun et al. (2008) it was not found a significant statistical relation between instructor's response timeliness and student's satisfaction. The discrepancy of those results may be due to multiple factors. But, as Anderson (2003) concludes, there are differences in the quality and value of interaction and also differences in student's preferences and needs for types and intensities of interaction.

Learner-teacher interaction plays a central role in the effectiveness and success of e-learning based courses. But, at educational institutions other types of interaction may also take place, such as student-student and teacher-teacher (Anderson, 2003) interaction, or the interaction between learners and teachers with others people working at the institution. Most investigations are approaching learner-teacher interaction, but there are several studies approaching learner-learner interactions (Shakelford and Maxwell, 2012; Kuo et al., 2014). Student interaction with the teaching staff and other students or participants is also a quality criteria included in the EFMD CEL Accreditation and by the E-xcellence project of European Association of Distance Teaching Universities (EADTU).

Satisfaction

Focusing on the needs of customers is at the heart of quality (Sallis, 2002), and if e-learning institutions fail to meet the needs of their students, they risk to lose them for one of their competitors. As a consequence, customer satisfaction is increasingly being considered as prime determinant in e-learning programs in competitive markets (Lee, 2010). Student satisfaction is also considered important for the achievement of quality by the largest accrediting agency in the U.S, DETC, and by Sloan Consortium. The impact of satisfaction in e-learning has been intensively investigated since it has been adopted by educational institutions and companies (Arbaugh, 2000; Thurmond et al, 2001; Sun et al., 2008, Johnson et al, 2008; Lee, 2010).

E-learning is seen as a cost effective answer to reduce work-training budget and to increase the value of educational expenditure (Massy, 2004). The growing interest for improving efficiencies at educational institutions and companies has led to the adoption of e-learning. Performance through efficiency has always been an organizational goal of high priority (Pushpakumari, 2008). In order to achieve performance, educational institutions need not only satisfied students but also satisfied employees.

The relationship between job satisfaction and performance has been studied in different analysis, especially for the industrial sector. Cummings (1970) found that satisfaction causes performance. Kornhauser and Sharp (1976) have conducted more than thirty studies in order to determinate the relationship and performance in the industrial sector. Mirvis and Lawer (1977) identified that satisfied tellers were less likely to show shortages and less likely to leave their jobs. Studies performed by Beyth-Marom et al. (2006), Veldman et al. (2013) and De Pablos Heredero et al, (2013a) found that there is a relation between job satisfaction and performance at educational institutions. An extensive experience and several researches have shown that the success of e-learning programs is related to high levels of personal and professional satisfaction (Thompson, 2002; Bolliger and Wasilik, 2009). Accreditation agencies recognize the importance of teachers in e-learning making reference to

the need that they have appropriate skills or for the institution to provide the right training (Dondi and Moretti, 2007). But, only few quality accreditation and assessment agencies (i.e. Sloan Consortium) take in consideration the importance of teacher's satisfaction with his job. Job satisfaction is generally understood as an attitude towards job and it is the result of employees' perception of how well their job provides those things which are viewed as important (Pushpakumary, 2008). Teacher's satisfaction is also an attitude of teacher towards its job. In e-learning, teacher satisfaction is defined as the perception that teaching in the e-learning environment is effective and professionally beneficial (Bolliger and Wasilik, 2009). A wide body of research has shown that students and teachers attitudes towards technology-mediated learning are a critical factor for e-learning success (Webster and Hackely, 1997; Soong et al., 2000, Selim 2007; Liaw et al., 2007a; Sun et al. 2008). Empirical studies (Trigwell, Prosser and Waterhouse, 1999; Virtanen and Lindblom-Yläne, 2009) established that students' attitude to learning is influenced by teaching approaches used by teachers. These research results have also been confirmed in e-learning by studies performed by Webster and Hackley (1997) and Piccoli et al. (2001).

Coordination

The importance of coordination has longer been studied at organizations. In their analysis of a representative sample of manufacturing firms, Lawrence and Lorsch (1967) found that coordination is positively related with organizational results. Research performed by Argote (1982) confirmed this positive relation between coordination and organizational results and Brandts and Cooper (2006) found that a good coordination can overcome failures at organizations.

Coordination is the integration of organization work in conditions of task and uncertain interdependence (Faraj and Xiao, 2006). Thompson (1967) suggested that coordination as a process of mutual adjustment is beneficial when tasks are highly interdependent. Later on, Thompson saw mutual adjustment as playing little role in organization since it is highly costly, and he argued that coordination takes place through mechanisms such as routines, timetables, previous planning and task normalization.

Learning is a social process (De Pablos et al., 2013a) and, as such, an effective teaching-learning method depends on the ability of properly coordinate different agents and to establish coordination amongst interdependently tasks performed by each participant in the teaching-learning process. Many scholars have stressed the importance of an effective coordination of processes in teaching and researching activities (Drucker, 1988; Scott Morton, 1991; Senge, 1992; Leonard-Barton, 1995; Toffler and Toffler; Davenport and Prusak, 1998; Earl, 2001; Biggs and Tang, 2011) and others

related it with quality in higher education (Van Vught and Westerheijden, 1994; Balderston, 1995; Cummings and Kiesler, 2007; Andras, 2011; Astin, 2012).

E-learning allows teaching and learning processes to take place without the need for participants to be present in the same place and time, but it is still a social process (Sunt et al., 2008). And as a social process it requires a properly coordination of tasks, students, teachers and other participants in the e-learning process. Universitat Oberta de Catalunya (UOC) is one example of virtual universities that considers coordination of activities as highly important for the quality of teaching (Hénard and Roseveare, 2012).

2.3.3. Other factors

Technological and organizational factors are critical, but because of its multiple dimensionalities (Swan, 2002) other factors can have an impact on the quality of e-learning.

In addition to the modes of interaction described in Organizational factors (See 2.3.2 Communication), there are other modes related to the quality in e-learning, such as, student-content and teacher-content interaction. Accreditation institutions, such as ASTD and Australian Computer Society, take into consideration the quality of learning resources when they evaluate the quality on e-learning programs. But the value of content depends on the extent to which it engages students and teachers in interaction, leading to relevant knowledge creation (Anderson, 2003).

As Flores-Crespo (2004) indicates, education is a very complex phenomenon due to its polyvalent character and its dependence from the cultural and social context where it takes place. The support of governments, businesses and local communities are a source of quality in education (Sallis, 2002). E-learning acceptance and success is highly dependent on the social support. National governments have financially supported the adoption of ICT in education and the implementation of e-learning programs. Massy's study of the European e-learning market for the European Commission (Massy, 2004) points out that public funding has stimulated the demand of e-learning traded products. A survey carried out in six European countries (Fiehl et al., 2011) has shown that local tax benefits supporting e-learning in Benelux countries and Spain have increased the levels of e-learning adoption for training in private companies. Researches have also employed cultural parameters in their studies regarding e-learning acceptance. Several studies have suggested that there is a relationship between cultural values and technology acceptance and usage in learning (Downey et al., 2005; Srite et al., 2008; Zaharias, 2008).

Theories of technology acceptance such as TAM2 (Venkatesh and Davis, 2000) show that social norms have an influence on the intention to use of technology. Social norms refer to users' perception that most people who are important to them want them to perform certain behaviour. In the case of e-

learning, this people may include community, parents, friends, colleagues, etc. Venkatesh and Davis (2000) found that social norms influence the utilization when the usage is mandatory. The adoption of e-learning at educational institutions and at companies is not always a voluntary process. Frequently, the decision of introducing IT in education and training is taken by the leaders of educational institutions, companies and governments. Therefore, social norms can have an impact on e-learning quality and success. Institutional commitment and support has been found to be critical for the success of e-learning-based programs (Govindsamy, 2002; Moore, 2005).

CHAPTER 3: RELATIONAL COORDINATION IN e-LEARNING

3.1. Relational Coordination

3.1.1. What Is Relational Coordination?

3.1.2. The Relational Coordination Model

3.2. The Importance of Relational Coordination in e-Learning

3. RELATIONAL COORDINATION IN E-LEARNING

3.1. Relational Coordination

As e-learning evolves, so does the concept of quality in the market. E-learning keeps the complexity of traditional education and adds a new dimension, technology, and others players in the market related to this dimension. As we mentioned in Chapter 2, when defining quality, it is important to take into account the perspective of all the stakeholders. Among the multiple factors affecting quality in e-learning, we have identified in the literature communication, coordination and satisfaction. Coordination is increasingly seen in literature as a social process (Faraj and Sproull, 2000; Gittell, 2001). Gittell (2009) says that, by coordinating work through communication and relationships, satisfaction and quality can be achieved.

This chapter introduces and explains the concept that is at the basis of this research: relational coordination. First, the concept is defined and then the model of relational coordination proposed by Gittell is presented. At the end of this chapter we explain the importance of relational coordination in e-learning and why we have chose Gittell's model for the empirical study.

3.1.1. What Is Relational Coordination?

Organizational theorists have developed different types of approaches to coordination, such as programming and feedback (Argote, 1982; March, 1991; López et al., 2011), impersonal versus mutual adjustment (Van de Ven et al. 1976; Faraj and Xiao; 2006) and formal versus informal feet (Kraut, 1998; Penuel et al. 2010).

Follett (1949) appears to be the first theorist that has proposed a relational theory of coordination, arguing that an effective coordination was not a mechanical process but rather a process of continuing interrelating between the parts and the whole. Increasingly, coordination is understood as a relational process (Weick and Roberts, 1993; Faraj and Sproull, 2000; Gittell, 2001) that involves not only the management of interdependencies between tasks (Malone and Crowston, 1994) but also the management of interdependencies between the people who perform those tasks (Gittell, 2009). Gittell defines relational coordination as communicating and relating for the purpose of task integration (Gittell, 2011).

3.1.2. The Relational Coordination Model

Gittell (2009) has proposed a model that puts emphasis on understanding the importance of coordinating the relationships and the dynamics of communication in organizations to reach best results. Medlin et al. (2005), Gittel (2001, 2002a, 2009), Gittell et al. (2004, 2008), Bond and Gittell (2010), De Pablos and López (2012), De Pablos and Haider (2013) and De Pablos et al. (2012, 2013 a,b,c) have applied models of relational coordination in different sectors; as airlines industry, health care and long-term care industries, teaching and learning, etc. The model has proved to be a power driven for both quality and efficiency outcomes.

According to the model of relational coordination, coordination processes take place through a network of relationship and communication dimensions. Relationships are represented by three dimensions, shared goals, shared knowledge and mutual respect, supported by frequent, timely and problem solving communication (Gittell et al., 2011). Using this coordination model, organizations can achieve best results, as it is described in figure 8.

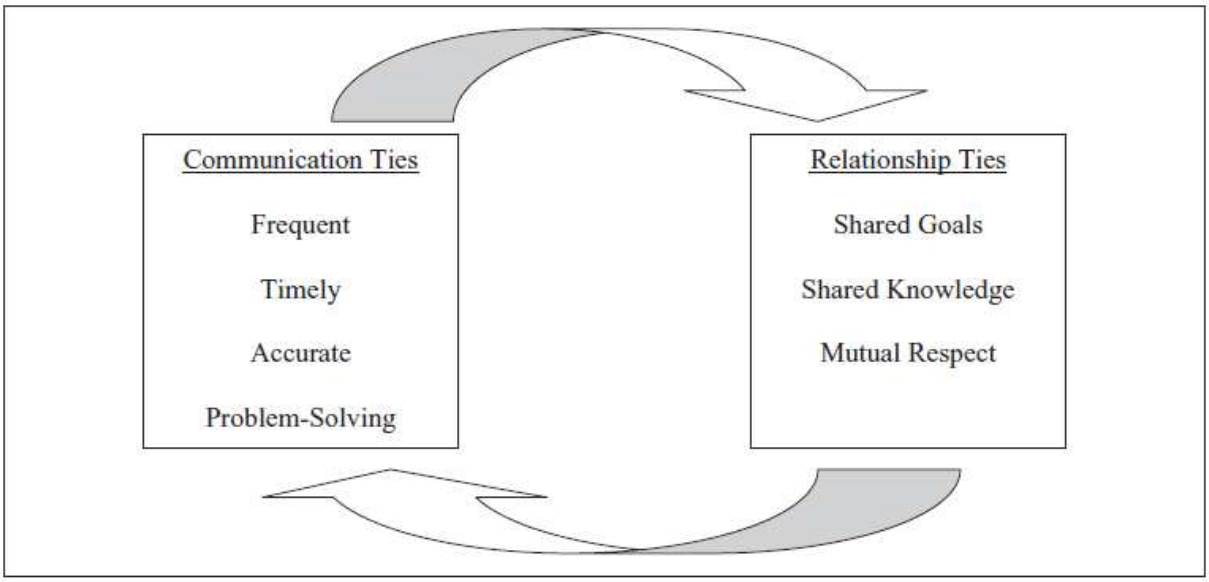

Figure 8. Dimensions of relational coordination (Gittell et al., 2008)

Gittell based her theory on the analysis of organizational scholars, who observed a more spontaneous form of coordination, mutual adjustment (Thompson, 1967) and teamwork (Van de Ven et al., 1976), other views of coordination (Adelfer, 1977; Ancona, 1987; Hackman, 1987; Malone and Crowston, 1994) and the focus of coordination based on relationships (Weick and Roberts, 1993; Liang et al., 1995; Quinn and Dutton, 2005; Faraj and Xiao, 2006; Heckser and Adler, 2007; Heckser et al., 2009) in corporate environments of high/low interdependence/uncertainty. She defines her

model as "a mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration" (Gittell, 2002b, p.301). Also, she explains that her theory differs from others. While in other theories shared knowledge is important, she argues that, even though, it is important, an effective coordination also needs shared goals, mutual respect and the three dimensions of communication. It also differs by focusing on relationships between roles rather than between specific individuals.

The relational dimensions of relational coordination are conceptualized as ties between work roles, rather than relationships that some profiles maintain in their daily functions (Gittell et al., 2011; Haider, 2013; De Pablos, 2013a). Relational coordination improves performance of a work process with task interdependencies, uncertainty and time constraints, by improving the work relationships between people who perform the tasks in that work, reinforced by a high-quality communication (Gittell, 2009, 2011).

The model is shaped around two types of dimensions: relational and communication dimensions.

From the communication dimensions the model includes:

- *Frequent communication*: the frequent communication improves the coordination of roles by the closeness generated as a consequence of a repetitive interaction (Gittell, 2010).

- *Timely communication*: delayed communication can have negative implications for organizational results. Therefore a fluent communication is important in the precise moment for the organizational performance (Waller, 1999).

- *Accurate communication*: a precise communication in the case of relevant information plays a critical role in the performance of group tasks (O'Reilly and Roberts, 1977).

- *Problem solving communication*: problem solving communication leads to the optimization of the overall process, as the communication between people who perform tasks will be oriented to solve problems that appear in a group performance characterized for a high interdependence, rather than on blaming when things go wrong (Deming, 1986; Gittell et al., 2011; López et al., 2011).

Relationships, based on the relational dimensions included in the model, shared goals, shared knowledge and mutual respect, enable employees to coordinate more effectively the work process in which they are engaged (Gittell, 2002a). The relational dimensions play the followings roles at organizations:

- *Shared goals*: this aspect plays a key role in the coordination of highly interdependent tasks (Saavedra et al., 1993, Wageman, 1995). Through shared goals, the stakeholders develop links that allow them to reach compatible conclusions with different ways of thinking and acting, as new pieces of information are available (Gittell et al., 2011).

- *Shared knowledge*: shared knowledge enables people to communicate with each other with accuracy, as they know not only their tasks but also how their work is related with the work of other profiles in the same process (Gittell et al., 2011). Through shared knowledge a dynamic is developed in which everyone knows about the consequence of changes in each task or role.

- *Mutual respect*: mutual respect generates an effective coordination, because profiles participants in the same process value the contribution of others and consider the impact of their actions in others (Gittell, 2002b).

3.2. The Importance of Relational Coordination in e-Learning

Relational coordination is the coordination of work through relationships of shared goals, shared knowledge and mutual respect, supported by frequent, timely, accurate and problem solving communication. Together this relationship and communication dynamics provide the basis for coordinated collective action (Gittel, 2011) in organizations or organizational processes, where high levels of task interdependence (Thompson, 1967), uncertainty (Argote, 1982), time restrictions (Adler et al., 1999) and tacit knowledge (Nonaka and Tacheuchi, 1995) are required. De Pablos et al. (2013d) found that these circumstances are met in teaching and learning processes. These circumstances are also characteristics of e-learning:

- *Task interdependence*: two tasks are considered to be interdependent for this model if each of them depends on the other for final purposes. In e-learning, the final result, the knowledge acquired by a learner, depends on the tasks that are shared by the teacher and learner. For example, the teacher must create, present and deliver the learning content in a way that it is easy for the learner to access the content and to understand it. But the result of the learning process also depends on student's effort to understand the learning content and on teacher-learner interaction. At organization, teachers usually also share tasks related with teaching in e-learning environments with other profiles, such as management, administration staffs, others teachers or tutors, technical support staff, etc.

- *Uncertainty*: is the lack of information relative to the requirements (Daft and Lengel, 1986). The relational coordination process provides the information by making use of

relations and communication amongst the workers. Therefore, the application of the relational coordination model provides best results when applied to organizations or organizational process with high degrees of uncertainty. Teaching and learning processes in e-learning contexts present today certain levels of uncertainty. For example, when they are creating the educational content, teachers do not know much about the digital literacy level of students or about the quality of their technical equipment or Internet connection. Also, the lack of body language in technology-mediated communication can led to uncertainty situations for all the participants in the e-learning process.

- *Time restrictions*: they have an amplified effect on the interdependence of tasks and on uncertainty, therefore relational coordination has a higher impact as time restrictions become wider. Tasks in e-learning are frequently characterized by time restrictions: the duration of courses is limited in time, students have established period of times to complete exercises and assessment and there is the need to give and receive feedback in a timely manner. In their study of how time factor is addressed in relevant research, Barberà and Kirshner (2010) have shown the importance of time in the e-learning field.

- Tacit knowledge[12]: in teaching and learning processes, teachers and learners always maintain a certain degree of tacit knowledge that is difficult to make explicit and that has an impact on results. The lack of physical interaction and non-verbal communication in e-learning full asynchronous courses increases the difficulty of making tacit knowledge explicit.

We can find several examples in researches and in literature where these circumstances are met in e-learning. Liaw et al. (2007b) have shown that e-learning systems by themselves are only providing information and are incapable of supporting knowledge construction. Learning performance and knowledge creation in e-learning systems depend on the exchange of information between participants in the process. The need of exchanging information to achieve best results makes teaching and learning tasks highly interdependent. Teaching without the visual control provided by the direct eye (Willis and Dickinson, 1997) produces certain degrees of uncertainty for the teacher. Students' need to wait for teacher's response and feedback (Song et al., 2004) leads to uncertainty about their learning tasks and the course objectives. Time management is a challenge that must continually be addressed in e-learning. Teacher timely response and feedback has been found to be a critical success factor for e-

[12] Tacit knowledge refers to the knowledge that people possess and ca use, but that is difficult to communicate and share with others by means of writing or verbalizing it. This type of knowledge it is difficult to extract and encode, it includes intuition and personal experience. It consists of mental models, patterns, skills, perceptions, experiences, believes, values or *know-how* (Nonaka and Takeuchi, 1995).

learning success (Arbaugh, 2002; Vonderwell, 2003; Song et al., 2004; Lee, 2010). Even, in e-learning contexts, learning takes place inevitably in social contexts (Liaw et al., 2007a), and the socialization that takes place when students share information with teachers or others students leads to the creation of tacit knowledge.

These circumstances together with the results of studies that have shown the importance of the quality of communication (Lee et al., 2010), the knowledge sharing (Liaw et al., 2007a) and social respect (Sung and Mayer, 2012) for e-learning success, make us think that the application of the relational coordination model to e-learning can explain best results. In this study we have analyzed if relational coordination can explain best results in terms off students' and teachers' satisfaction in e-learning contexts.

CHAPTER 4: THE EMPIRICAL STUDY

4.1. The Model and Hypotheses

4.1.1. The Proposed Model

4.1.2. Hypotheses' Approach

4.2. Research Methodology

4.3. Results

4.3.1. Results Students

4.3.2. Results Teachers

4.3.3. Conclusions from the Empirical Analysis of the Two Samples: Students and Teachers.

4. THE EMPIRICAL STUDY

4.1 The Model and Hypotheses

4.1.1. The Proposed Model

Human relations and social organization are a centre of learning and teaching theories today (Liaw et al., 2007b; De Pablos et al. 2012; De Pablos et al., 2013a; Johnson, 2013). In recent years, scholars have shown an increase interest in the relationship between technological change and social organization of academic work (Smith and Rhoades, 2006; Lin and Ha, 2009; Johnson, 2013), the impact of social presence and interaction in the success of a "virtual classroom" (Sung and Meyer, 2012) and the importance of a communication of quality between students and teachers (Lee, 2010). Gittell (2009) affirms that, by using the relational coordination model (See Chapter 3, section 3.1), organizations can achieve best results in terms of quality and efficiency performance. Relationships are the key component of relational coordination. Relationships are of quality if they are based on shared goals, shared knowledge and mutual respect, supported by frequent, timely and problem solving communication. In addition, relational coordination may improve job satisfaction by making easier for employees to access the resources needed to accomplish their job. De Pablos et al. (2013b,d) have proven the positive impact of relational coordination in teaching and researching activities at universities.

The main objective of this research is to evaluate the impact of the relational coordination on two main pillars for the quality of e-learning-based courses, student's satisfaction and teacher's job satisfaction. For this purpose, it was performed an empirical analysis of two representative samples of students and teachers that are involved in online courses in universities and e-learning private companies. Next figure (Figure 9) shows the coordination relational model adapted for e-learning contexts.

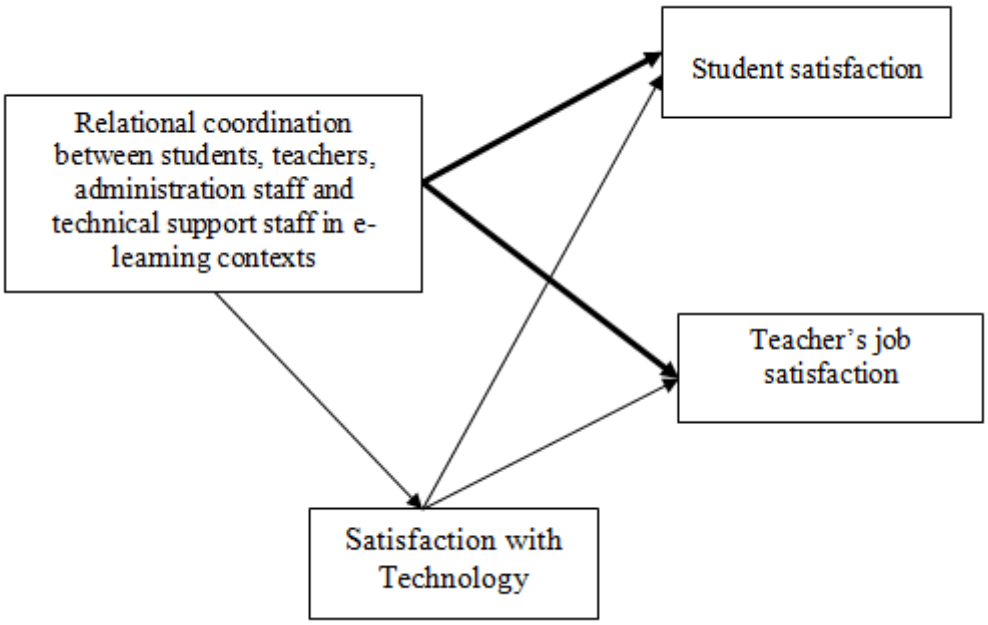

Figure 9. Relational coordination, student satisfaction, teacher's job satisfaction and satisfaction with technology in e-learning (own elaborated, 2014).

The type and nature of relationships that students and teachers establish during the learning process are different. In the case of students, student-teacher and student-student interaction (Anderson, 2003) are the most common types of interaction in e-learning. But, during the process, students may need to establish relationships with other profiles working at the educational institution, such as the administration staff (e.g. for question regarding the enrolment, the diploma, etc.) or the technical support staff (when technical problems arise). Some of these types of interactions have been also found in the case of teachers, such as teacher-student, teacher-administration staff and teacher-technical support. But, due to the internal organizations of educational institutions, teachers must often establish relationships with other profiles involved in the e-learning process, like other teachers or a boss. The final variable measured, final satisfaction (FS) is also different: in the case of students we measure their final satisfaction with the course, while in the case of teachers, job satisfaction is measured. As a consequence, two different analyses were performed for each sample, adapting the model for each context.

The structure of the model has been kept the same in both cases, in order to compare the results. In both cases, we consider that final satisfaction (FS) is reached through high-quality relationships, supported by the three dimensions of relationships, shared goals (SG), shared knowledge (SK) and mutual respect (MR), the three dimensions of communication, frequent (FC), timely (TC) and problem solving (PS) communication and by an online platform of quality (SP).

4.1.2. Hypotheses' Approach

Figure 10 offers an overview of the model created for the statistical analysis and the hypotheses.

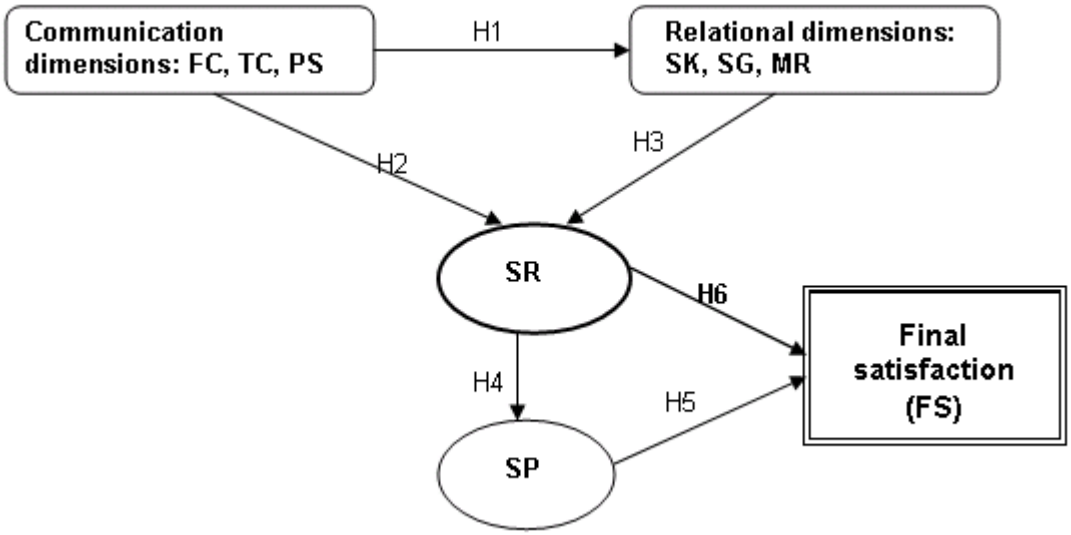

Figure 10. The proposed model and hypotheses

H1. *Frequent (FC), timely (TC) and problem solving (PS) communication will positively influence the three relationship dimensions, shared goals (SG), shared knowledge (SK) and mutual respect (MR)*

Newcomb (1956) affirmed that frequent, high-quality communication develops the basis for trustful and respectful relationships. Sung and Mayer (2012) have identified timely communication as an indicator of social respect in online education and Gittell (2002a) argued that the adjustment between communication and relationships is an important basis of the relational coordination model. Therefore the main objective of this hypothesis is to analyze if the three relationships dimensions of relational coordination (SG, SK and MR) are positively influenced by a communication that is frequent (FC), timely (TC) and problem solving (PS).

Communication is effective if it solve problems when they occur. Because an effective computer-mediated communication depends on its frequency and timeliness (Swan, 2002), it was also analyzed the relationships between the three dimension of communication (Figure 11). The communication channel (Channel) was also taken into account as a variable that can have an impact on the quality of communication.

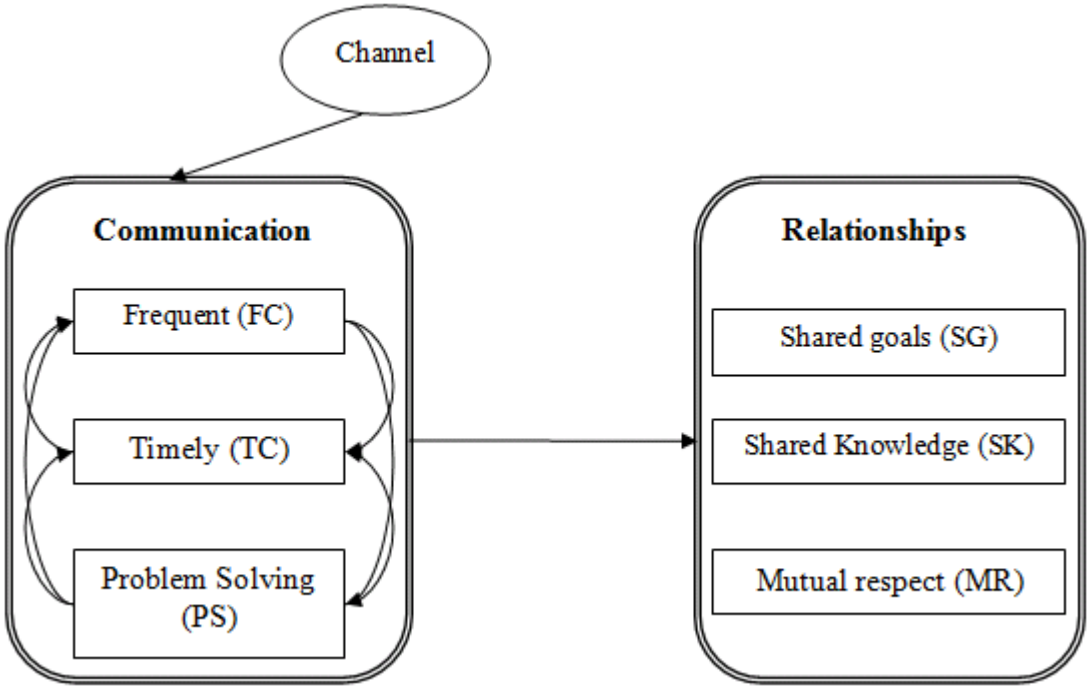

Figure 11. Relationships analyzed in H1

H2. *Problem solving (PS) communication has a positive impact on the quality of relationships (SR) in e-learning contexts.*

Problem solving communication (PS) plays a critical role on the optimization of a work process, as the communication between the persons will be oriented to solve the problems that appear during the process, rather than on blaming when things go wrong (Gittel, 2011). The importance of these dimension of communication make us think that it can have a direct impact on the quality of relationships (SR) between the people involved in e-learning-based education and training.

H3. *Relationships based on shared goals (SG), shared knowledge (SK) and mutual respect (MR) increase students' and teachers' satisfaction with the work of other profiles (SR) involved in the e-learning process.*

Relational coordination improves the performance of a work process by improving the work relationships (Gittell, 2011). The improved relationships, based on shared goals, shared knowledge and mutual respect, enable the participants in a work process to achieve a better coordination of their tasks (Gittell, 2002a). Therefore, in this hypothesis is tested if the three relational dimensions, shared goals (SG), shared knowledge (SK) and mutual respect (MR) increase the quality of relationships that students and teachers establish with other profiles during the learning and teaching process.

We assume that during the relational coordination process, an adjustment between the three relational dimensions takes place. We expect that mutual respect (MR) increases shared goals (SG) and shared knowledge (SK), and that shared goals (SG) increases shared knowledge (SK). Additionally, in this hypothesis these three relationships are also tested.

H4. *High-quality relationships (SR) have a positive effect on learners' and teacher's satisfaction with the online platform (SP).*

E-learning market offers a wide range of learning technologies. Chapter I (see section 1.3. The e-learning market) provides the details of the different solutions offered on the market. In this study, the term online platform is used as a reference to LMSs, the most used learning technologies by educational institutions. But many scholars (Area, 2005; Kirwood and Price, 2006, Johnson et al., 2008, Zhan and Mey, 2013), affirm that the quality of educational processes in e-learning are not depending so much on the technology, but on the quality of student-teacher interaction. As Bates (1995:8) indicates: "Good teaching may overcome a poor choice in the use of technology, but technology will never save poor teaching; usually it makes it worse". De Pablos et al. (2013a) affirm that teaching processes depend on the quality of interactions. Relating these finding with Bates' statement, we can say that the quality of relationships have a positive impact on teaching processes and, consequently, on the acceptance and satisfaction with the technology used in the process. But, in this hypothesis we extend the analysis to all types of interactions that can take place during the process. Hence, in this hypothesis we test if high-quality relationships (SR) have a positive impact on learners' and teachers' satisfaction with the online platform (SP).

H5. *Learners' and teachers' satisfaction with the online platform (SP) has an impact on learner's satisfaction with e-learning-based course and on teachers' satisfaction with his job (FS).*

The relationship between the perceived quality of technology and students' satisfaction in e-learning has been intensively analysed by scholars in the last 20 years (Webster and Hackley, 1997; Piccoli et al. 2001; Soong et al., 2001, Selim, 2007; Sun et al. 2008; Naveh et al. 2010; Islam, 2013). A low-quality technology can discourage students to maintain e-learning-based courses as an option (Sun et al., 2008), therefore it is still important to investigate its impact on final student satisfaction.

Teachers' acceptance of the use of technology in teaching and its impact on their work has also been analyzed by several studies. Johnson (2013) approached teachers' perception of the impact of instructional technology on their work, whereas that Alswaby et al. (2013) have investigated the role of IT infrastructure in enhancing job performance at universities. Liaw et al. (2007a) found that perceived satisfaction with technology is a critical factor for teachers' satisfaction with e-learning.

Accordingly this study approaches the relation between the perceived satisfaction with the online platform (SP) and teacher's satisfaction with his job (FS).

H6. *High-quality relationships (SR) increase learners' and teachers' final satisfaction (FS)*

Relational coordination is not only improving performance but it may be also a source of satisfaction for people involved in a work process, as it makes it easier to access the resources needed to accomplish one's work (Gittell, 2009). As a result, we expected that high-quality relationships (SR) between participants in e-learning would be positively related with learner's final satisfaction with e-learning-based courses and teacher's final satisfaction with his job.

4.2. Research Methodology

Student and teacher course-related behaviour are driven by perceptions. Perception is defined as the process of creating meaning by selecting, organizing and interpreting information (Wood, 2012). Students decision in e-learning-based courses are often guided by their perceptions of the quality of the learning experience (Otter et al., 2013) and teacher's adoption of technology in teaching processes depends on their perceptions of usefulness and ease of use (Hernández-Ramos et al. 2014; Schoonenboom, 2014). We did not found structured data basis to collect the information about students' an teachers' perceptions of e-learning education and training and therefore the questionnaire was the best methodology to collect the data we need to validate the hypotheses.

The questionnaires used to collect the data are adapted from the De Pablos et al. (2013b). Both questionnaires are structured in different parts to collect data regarding: personal data, the context of the course, technology, relational coordination and final satisfaction. Next table (Table 3) offers an overview of the questionnaires[13]. The questions regarding the frequency of interactions, communication and relationship dimensions of relational coordination were measured using a five-point, equally spaced, Likert scale (Likert, 1974). The answers choices ranged from "never = 1" to "constantly = 5". Whereas the questions regarding satisfaction with technology (SP) and final satisfaction were measured using a four-point, equally spaced, Likert scale, from 1 which means "very dissatisfied" to 4, which means "very satisfied".

[13] The complete questionnaires are attached as Appendix A and Appendix B page 131 and 135.

Table 3 Questionnaires' structure

Parts of the questionnaire	Type of data measured
Personal data	Sex, age, country of origin, previous experience with e-learning
Online course context	Type of institution that offers the course (university/private company) Duration of the course Method of course (synchronous, asynchronous, mixed)
Technology	The online platform used to impart the course Satisfaction with the online platform
Relational coordination *Communication dimensions:* *Relational dimensions:*	The frequency of communication with each profile involved in the learning/teaching process The need that different profiles offer information at specific times The frequency of communication for the solving of problems The need that different profiles involved in the learning-teaching process have to share information and knowledge The perception that students and teachers have about sharing goals with other profiles they interact with The perception that students and teachers have about how others respect their work
Final satisfaction	Student's satisfaction with the online course Teacher's satisfaction with his work

The questionnaires were sent to representative samples of students and teachers of online courses from Spanish universities and companies. They were asked to complete an online questionnaire using Google Docs. We do not know the total number of persons that received the questionnaires, as they

were sent not only directly to students and teachers but, also to managers of organizations who send them to their colleagues and students. We received 134 answers from students and 38 answers from teachers. Table 4 offers the most important attributes taken into account for the technical design of the surveys.

Table 4. The technical fiche of the two samples

TECHNICAL FICHE
UNIVERSE: e-Learning students and teachers from Spanish universities and companies
GEOGRAPHIC AREA: all the territories from where students and teachers are accessing e-learning courses: Spain, other European countries, Latin America, US, Middle East, Other
DESIGN OF THE SURVEYS: The researchers by making use of deep interviews
SAMPLES SIZE: 134 students; 38 teachers
SAMPLE ERROR: +/-10% (P=Q=50)
LEVEL OF TRUST: 95,5% (2 sigma)
SAMPLE DESIGN: a survey by person
FIELD WORK: e-Learning-based courses students and teachers
DATES: February to May 2013

From the total number of answers received from students, 84 of them have take the course with a university and 50 with a company, 85% of the students are from Spain and 72% of them have had previous experience with e-learning (Figure 12). Figure 13 shows the sex and age of respondent students. In Figure 14 are presented features of the online course context, such as the duration and the method of course. And Figure 15 presents the online platforms used to impart the online courses.

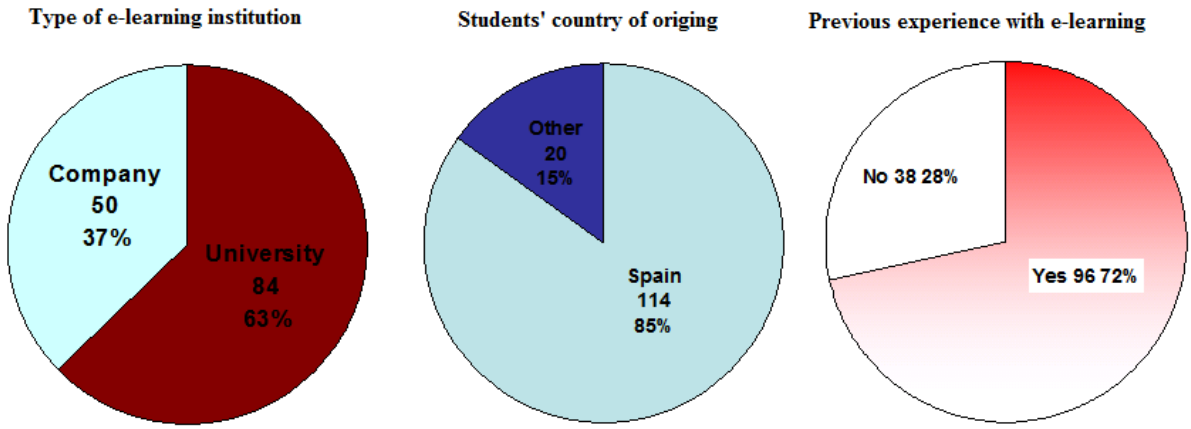

Figure 12. Students' sample characteristics: type of institution where they are taken the online course, country of origin and previous experience with e-Learning

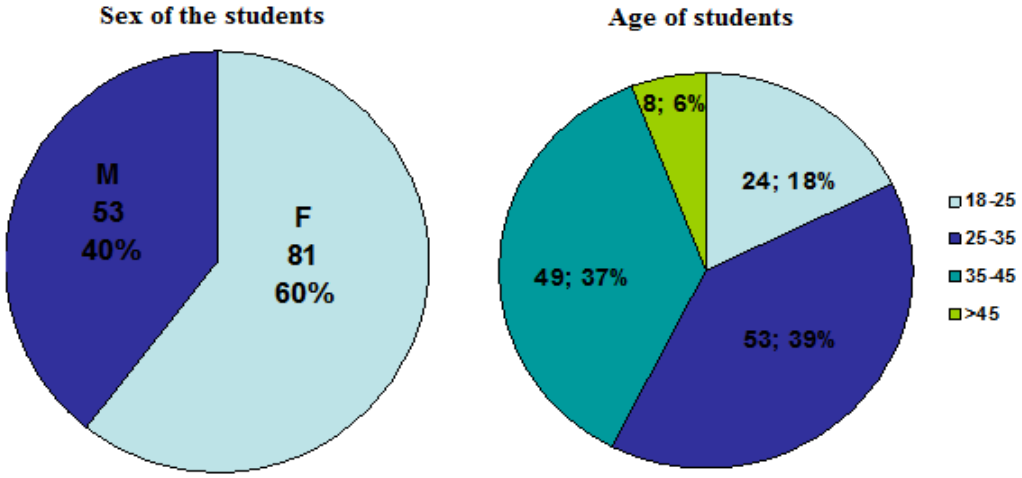

Figure 13. Students' sample characteristics: sex and age.

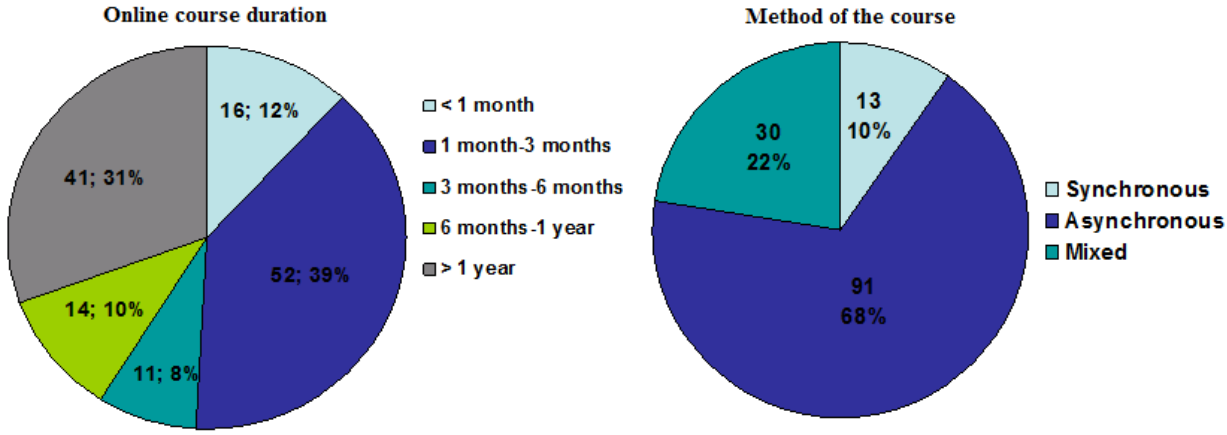

Figure 14: Students' sample characteristics: online course duration and the method used to impart the course

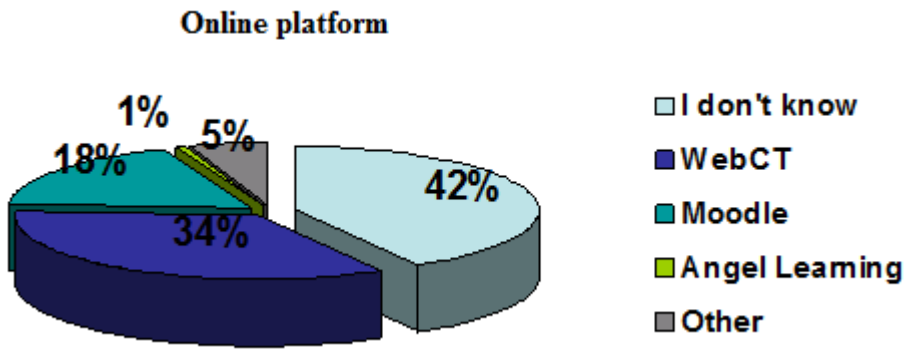

Figure 15: Students' sample characteristics: the online platform used to impart the course

From the 38 teachers that have answered to the survey, 29 of them were teaching online courses at university and 9 at a private company, 95% of them were from Spain and 82% have had previous experience teaching online courses (Figure 16).

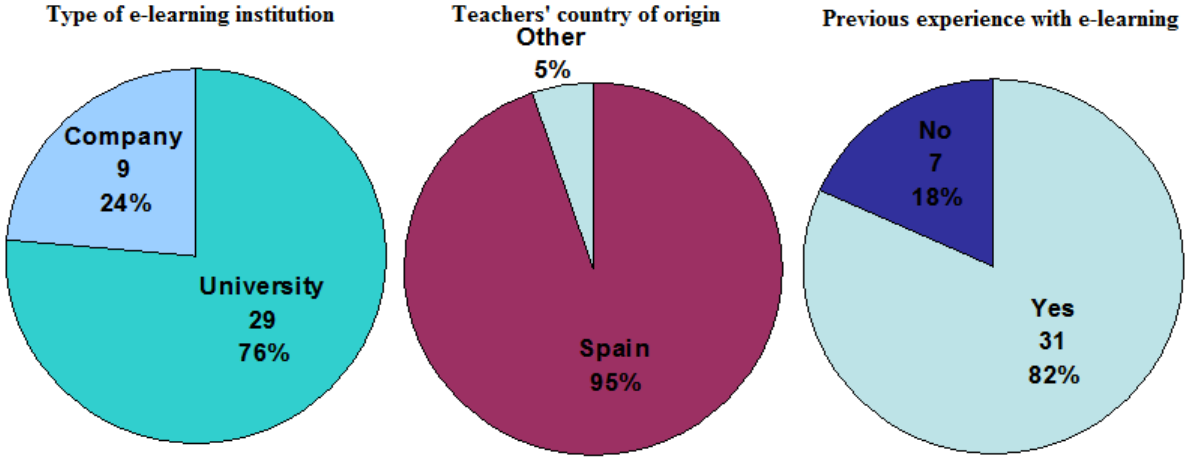

Figure 16. Teachers' sample characteristics: type of institution where they are given the online course, country of origin and previous experience with e-Learning

More than half of teachers are males and have an age between 35 and 45 years (Figure 17). In Figure 18 the features of the online course context are presented, such as the duration, the method of course. The platform used to impart the course is shown in Figure 19.

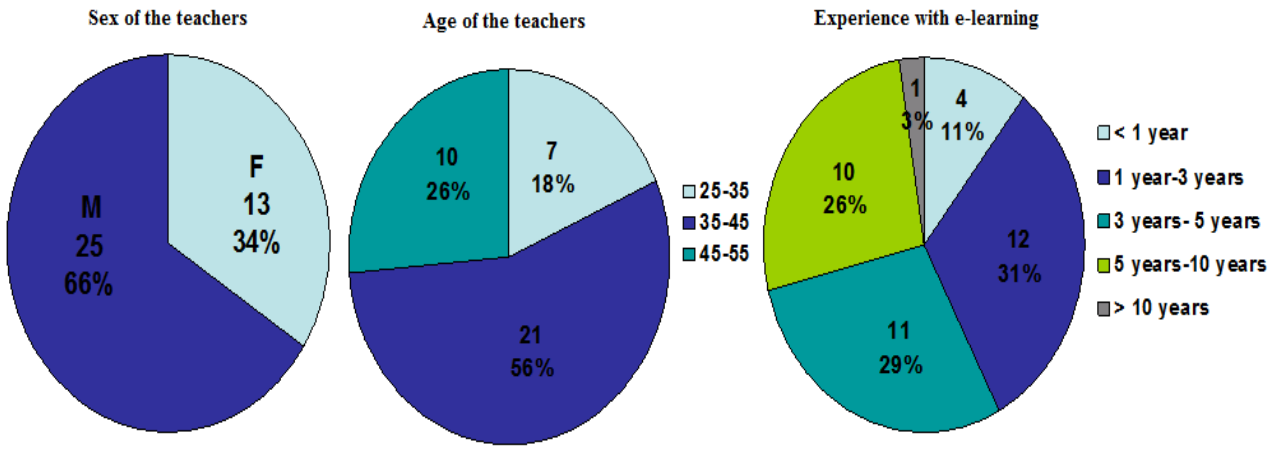

Figure 17. Teachers' sample characteristics: sex, age and years of experience with e-Learning

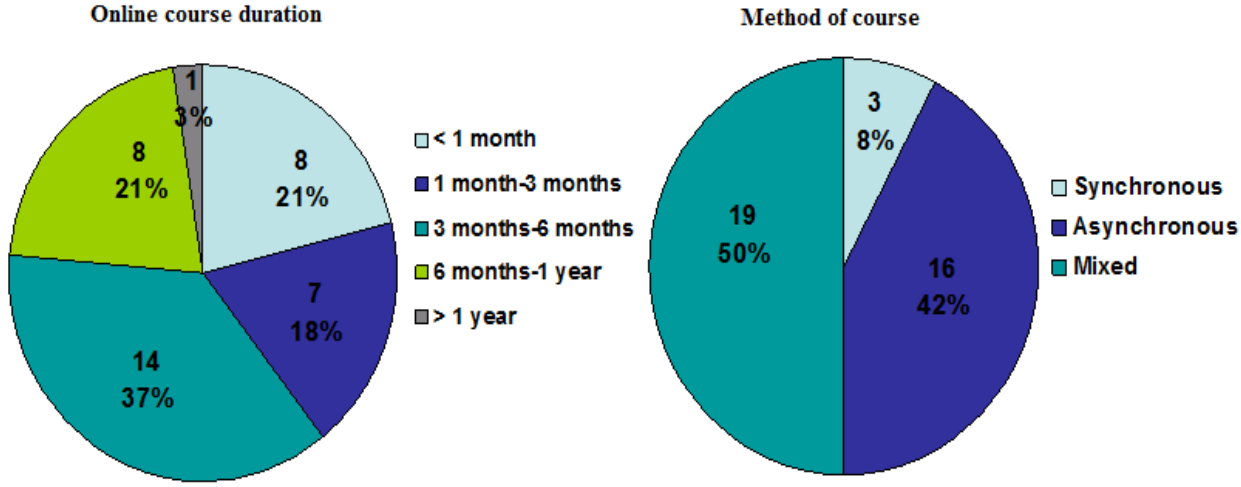

Figure 18: Teachers' sample characteristics: online course duration and the method used to impart the online course

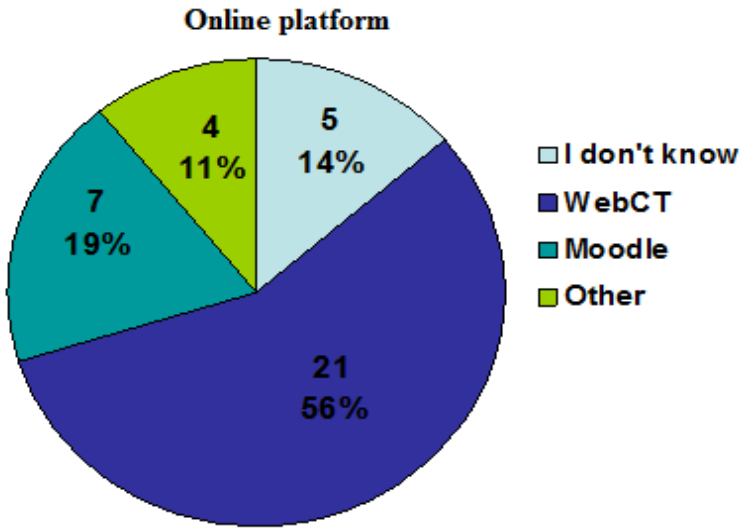

Figure 19: Teachers' sample characteristics: the online platform used to impart the online course

For the empirical we have used Structural Equation Models (SEM). SEM techniques have been heavily used in measuring user acceptance of information technology (Venkatesh et al., 2003) and it is also commonly used in measuring technology acceptance in learning and teaching (McGill and Klobas, 2009; Stantchev et al, 2014; Hernández-Ramos et al., 2014), e-learning acceptance (Liaw, et al., 2007a; Lee, 2010) and the factors affecting e-learning quality and success (Selim, 2007; Johnson et al. 2008; Lee and Lee, 2008; Lee, 2010; Zhan and Mei, 2013).

4.3. Results

The structural equation model (SEM) used to validate the hypothesis was estimated via Partial Least Squares (PLS) procedures by using the Smart PLS 2.0. M3 Software (Ringle et al., 2005). In the case of both models, parameters estimation was made by bootstrapping, in order to minimize their standard errors (Efron and Gong, 1983; Efron and Tibisharni).

PLS-SEM was chosen to estimate the model because the phenomenon investigated is relatively new and its modelling is in a developing stage, minimal recommendations exist concerning sample size (the PLS algorithm converges in most of the cases achieving high statistical power even with reduce sample sizes and it is robust against missing data). It also presents prediction accuracy and non-data multinormality requirements (Henseler et al., 2009; Joreskög and Wold, 1982).

4.3.1. Results Students

Discriminant validity was evaluated according to the Fornell-Larcker criterion (Fornerll-Larcker, 1981). Correlations between latent variables should be lower than the square root of the corresponding AVE (table 5). As it can be observed in table 5 these is the case for the majority of variables.

Table 5. Latent Variable Correlations Students

	CContext	Channel	FC	FS	MR	MR * PS	PS	SG	SG * MR	SK	SP	SR	TC
CContext	**0,88**												
Channel	-0.37	**0,80**											
FC	-0,30	0,53	**0,76**										
FS	-0,49	0,32	0,31	**0,84**									
MR	-0,50	0,39	0,50	0,56	**0,84**								
MR * PS	-0,48	0,43	0,60	0,57	0,88	**0,80**							
PS	-0,33	0,37	0,51	0,49	0,57	0,85	**0,71**						
SG	-0,31	0,51	0,58	0,52	0,64	0,68	0,58	**0,88**					
SG * MR	-0,46	0,49	0,61	0,55	0,87	0,86	0,59	0,89	**0,88**				
SK	-0,42	0,45	0,63	0,51	0,71	0,78	0,67	0,75	0,81	**0,79**			
SP	-0,38	0,23	0,23	0,69	0,33	0,38	0,37	0,38	0,37	0,41	**0,79**		
SR	-0,49	0,32	0,39	0,76	0,66	0,68	0,63	0,52	0,59	0,56	0,51	**0,84**	
TC	-0,14	0,27	0,62	0,23	0,40	0,55	0,61	0,43	0,42	0,56	0,25	0,35	**0,77**

Internal consistency was measured by Cronbach's alpha and by Composite Reliability (Table 6). All the variable take Cronbach's alfa values greater then the required 0,5 (Nunally, 1978), with the exceptions of the variable Channel, which has a value of 0,45. Composite reliability values are higher then the threshold recommended 0.7. Finally, all the AVE values exceed the 0.5 as recommended by Fornell and Larcker (1981). Items communalities, the square of a standardized indicator outer loading take values higher than the 0,5 threshold.

Table 6. Quality Criteria Overview Students

	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
CContext	0,77	0,87		0,71	0,78	
Channel	0,64	0,77		0,45	0,64	
FC	0,58	0,80	0,29	0,63	0,58	0,17
FS	0,71	0,94	0,71	0,92	0,71	0,29
MR	0,70	0,88	0,47	0,79	0,70	0,15
MR * PS	0,64	0,94		0,93	0,64	
PS	0,51	0,76	0,37	0,52	0,51	0,20
SG	0,71	0,83	0,50	0,60	0,71	0,20
SG * MR	0,78	0,96		0,94	0,78	
SK	0,62	0,83	0,71	0,68	0,62	0,09
SP	0,63	0.87	0,26	0,80	0,63	0,16
SR	0,71	0,88	0,55	0,80	0,71	0,28
TC	0,60	0,81	0,39	0,65	0,60	0,23

Statistical significance was sized up by means of 500 resampling bootstrap (Table 7) to minimize the estimator standard errors (Efron and Gong, 1983; Efron and Tibishiarni, 1993).

The cross loading matrix (Table 8) also points out discriminant validity, showing that an indicator's loading on its construct is higher than all of its cross loadings with other constructs.

Tabel 7. Total Effects Students (Mean, STDEV, T-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
H1.5 Channel → FC	0,54	0,54	0,06	0,06	9,19
H1.2 FC → MR	0,36	0,36	0,08	0,008	4,69
H1.1 FC → SG	0,52	0,52	0,07	0,07	7,66
H1.6 FC → TC	0,62	0,63	0,06	0,06	9,80
H3.3 MR → SG	0,46	0,47	0,08	0,08	5,87
H3.4 MR → SK	0,21	0,22	0,17	0,17	1,23
H3.1 MR → SR	0,84	0,80	0,16	0,16	5,33

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
H3.6 MR * PS → SR	-0,67	-0,61	0,24	0,24	2,77
H3.5 CContext → MR	-0,32	-0,32	0,06	0,06	5,30
H1.4 PS → MR	0,35	0,35	0,08	0,08	4,17
H2.1 PS → SR	1,01	0,97	0,22	0,22	4,58
H3.2 SG → SK	0,20	0,19	0,13	0,13	1,57
H2.2 SG * MR → SK	0,42	0,42	0,20	0,20	2,09
H5 SP → FS	0,41	0,41	0,07	0,07	5,63
H6 SR → FS	0,76	0,77	0,04	0,04	19,63
H4 SR → SP	0,51	0,53	0,06	0,06	8,03
H1.3 TC → SK	0,29	0,30	0,07	0,07	4,23
H1.7 TC → PS	0,61	0,61	0,07	0,07	9,03

The significance of the path coefficients was determined with the help of pseudo t-statistics from the bootstrapping procedure. Overall, t-values exceed the 1,96 limit value (95% two tailed confidence interval), with the exception of the relationship (H3.4) between mutual respect (MR) and shared knowledge (SK) ($t = 1,23$; $p = 0,19$) and the relationship (H3.2) between shared goals (SG) and shared knowledge (SK) ($t = 1,57$; $p = 0,065$). The rest of path coefficients take the recommended $p < 0,5$ value and are statistically significant (Figure 20).

The moderating effect of mutual respect (MR) between the predictor variable shared goals (SG) and shared knowledge (SK) is decreasing the two relationships mentioned before (H3.4 and H3.2). The moderating effect MR*PS makes stronger the relationship between MR and SR (H3.1). When PS is decreasing the impact of MR and SR is higher. The important role of PS on the optimization of work processes and of MR in coordination explains the role of these relational coordination dimensions as moderator variables.

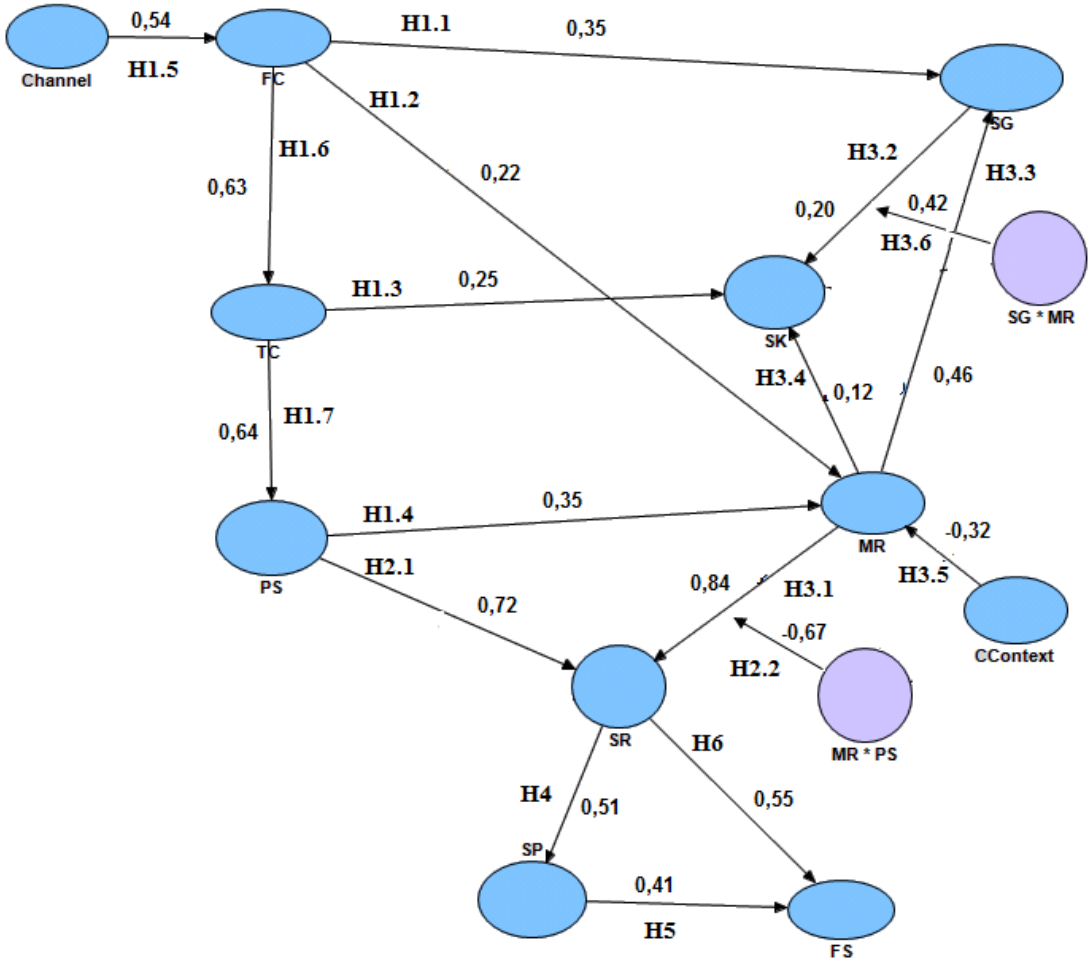

Figure 20. The model proposed for analyzing students' sample and the results of PLS algorithm calculation (path values)

Table 8. Cross Loading Table Students[14]

	CContext	Channel	FC	FS	MR	MR * PS	PS	SG	SG * MR	SK	SP	SR	TC
DOC	0,89	-0,33	-0,27	-043	-0,46	-0,46	-0,34	-0,27	-0,40	-0,35	-0,32	-0,44	-0,14
FCAS	-0,19	0,41	0,82	0,15	0,39	0,46	0,37	0,50	0,51	0,49	0,13	0,27	0,57
FCT	-0,19	0,32	0,61	0,39	0,40	0,38	0,30	0,38	0,39	0,39	0,25	0,32	0,29
FCTS	-0,30	0,49	0,84	0,21	0,37	0,53	0,50	0,44	0,48	0,54	0,17	0,32	0,54
Institution	0,87	-0,32	-0,26	-0,43	-0,42	-0,39	-0,24	-0,29	-0,40	-0,39	-0,35	-0,42	-0,11
MRAS	-0,41	0,32	0,36	0,41	0,86	0,76	0,41	0,52	0,79	0,56	0,20	0,49	0,23
MRAS * PSAS	-0,27	0,34	0,51	0,29	0,68	0,81	0,65	0,52	0,68	0,59	0,14	0,45	0,49
MRAS * PST	-0,46	0,34	0,40	0,53	0,86	0,81	0,55	0,57	0,80	0,59	0,35	0,57	0,27
MRAS * PSTS	-0,40	0,38	0,50	0,46	0,71	0,85	0,67	0,60	0,77	0,68	0,30	0,51	0,42
MRT	-0,38	0,27	0,42	0,59	0,76	0,65	0,53	0,59	0,63	0,65	0,38	0,63	0,43
MRT * PSAS	-0,20	0,25	0,45	0,31	0,53	0,74	0,79	0,49	0,53	0,57	0,18	0,49	0,58
MRT * PST	-0,43	0,27	0,37	0,61	0,68	0,69	0,65	0,54	0,60	0,52	0,46	0,66	0,33
MRT * PSTS	-0,32	0,36	0,50	0,48	0,54	0,74	0,80	0,57	0,58	0,67	0,35	0,53	0,56
MRTS	-0,47	0,40	0,47	0,40	0,88	0,81	0,48	0,49	0,78	0,65	0,24	0,52	0,33
MRTS * PSAS	-0,31	0,38	0,57	0,29	0,69	0,85	0,69	0,52	0,70	0,63	0,15	0,47	0,53
MRTS * PST	-0,50	0,39	0,47	0,53	0,85	0,83	0,58	0,52	0,76	0,64	0,37	0,59	0,33

[14] The meaning of the abbreviations from the Table 14 is explained in the Glossary of Abbreviations from Cross Loading Tables page 105.

	CContext	Channel	FC	FS	MR	MR * PS	PS	SG	SG * MR	SK	SP	SR	TC
MRTS * PSTS	-0,46	0,42	0,57	0,44	0,71	0,85	0,69	0,54	0,72	0,72	0,31	0,51	0,49
OS	-0,40	0,31	0,30	0,91	0,54	0,54	0,49	0,50	0,53	0,48	0,65	0,71	0,27
OSAM	-0,41	0,25	0,33	0,83	0,47	0,48	0,41	0,42	0,44	0,45	0,60	0,63	0,20
OSMQ	-0,37	0,28	0,17	0,85	0,43	0,43	0,34	0,39	0,44	0,37	0,57	0,56	0,17
OSMU	-0,38	0,24	0,17	0,84	0,42	0,41	0,32	0,39	0,42	0,36	0,56	0,55	0,14
OSSAT	-0,43	0,21	0,26	0,76	0,38	0,42	0,38	0,36	0,38	0,40	0,54	0,57	0,16
OSTW	-0,49	0,34	0,32	0,88	0,58	0,57	0,52	0,52	0,54	0,49	0,60	0,81	0,23
PSAS	-0,11	0,24	0,40	0,16	0,36	0,62	0,74	0,38	0,39	0,47	0,07	0,37	0,53
PST	-0,35	0,25	0,30	0,53	0,52	0,59	0,65	0,45	0,47	0,42	0,44	0,56	0,29
PSTS	-0,24	0,32	0,41	0,34	0,33	0,60	0,75	0,42	0,40	0,55	0,25	0,41	0,50
SGAS	-0,26	0,44	0,53	0,37	0,55	0,62	0,51	0,86	0,82	0,67	0,28	0,45	0,40
SGAS * MRAS	-0,38	0,43	0,54	0,42	0,75	0,75	0,47	0,78	0,92	0,69	0,28	0,48	0,34
SGAS * MRT	-0,35	0,40	0,48	0,61	0,67	0,64	0,53	0,80	0,75	0,64	0,42	0,56	0,35
SGAS * MRTS	-0,47	0,48	0,55	0,52	0,87	0,84	0,55	0,72	0,90	0,74	0,33	0,55	0,37
SGT	-0,27	0,42	0,46	0,51	0,53	0,53	0,48	0,83	0,68	0,60	0,38	0,42	0,32
SGT * MRAS	-0,43	0,43	0,48	0,51	0,87	0,81	0,51	0,75	0,92	0,70	0,31	0,51	0,31
SGT * MRT	-0,37	0,40	0,47	0,61	0,67	0,64	0,53	0,80	0,75	0,64	0,42	0,56	0,35
SGT * MRTS	-0,47	0,48	0,55	0,52	0,87	0,84	0,55	0,72	0,90	0,74	0,33	0,55	0,37

	CContext	Channel	FC	FS	MR	MR * PS	PS	SG	SG * MR	SK	SP	SR	TC
SKAS	-0,36	0,40	0,56	0,43	0,63	0,68	0,53	0,72	0,72	0,90	0,35	0,47	0,48
SKT	-0,17	0,21	0,37	0,44	0,50	0,46	0,40	0,46	0,45	0,58	0,32	0,40	0,38
SKTS	-0,42	0,43	0,54	0,35	0,55	0,70	0,64	0,57	0,64	0,85	0,29	0,45	0,46
SM	-0,41	0,89	0,51	0,40	0,39	0,43	0,34	0,50	0,50	0,43	0,29	0,35	0,21
SPEU	-0,08	0,04	0,08	0,44	0,15	0,13	0,13	0,20	0,17	0,23	0,71	0,24	0,17
SPF	-0,29	0,13	0,14	0,54	0,23	0,29	0,30	0,29	0,27	0,30	0,85	0,40	0,16
SPH	-0,34	0,17	0,25	0,45	0,19	0,27	0,23	0,25	0,26	0,27	0,68	0,32	0,16
SPOS	-0,42	0,33	0,24	0,71	0,41	0,44	0,43	0,42	0,42	0,44	0,91	0,58	0,26
SWAS	-0,36	0,23	0,31	0,49	0,52	0,54	0,51	0,37	0,45	0,39	0,32	0,83	0,28
SWT	-0,54	0,36	0,32	0,84	0,61	0,58	0,49	0,51	0,56	0,52	0,56	0,86	0,23
SWTS	-0,31	0,20	0,36	0,52	0,52	0,59	0,60	0,40	0,46	0,47	0,37	0,83	0,39
TCAS	-0,05	0,15	0,51	0,08	0,31	0,43	0,43	0,34	0,36	0,45	0,17	0,23	0,82
TCT	-0,08	0,19	0,43	0,36	0,36	0,34	0,38	0,37	0,31	0,41	0,27	0,34	0,66
TCTS	-0,19	0,29	0,51	0,14	0,27	0,49	0,58	0,29	0,31	0,44	0,15	0,25	0,82
email	-0,13	0,69	0,32	0,05	0,21	0,24	0,25	0,28	0,24	0,27	0,04	0,12	0,25

As learners who make an e-learning course with a university or with a private company can be two groups with different needs, we also compared statistically the two groups of learners to see if there are differences in the proposed hypotheses. Statistically significant differences between two groups are met when the hypotheses test of equality of the estimated model show path values lower then 0,05 (table 9).

Table 9. Path values from the hypotheses test of equality (university students vs. company students)

Hypothesis	p-value
H1.5 Channel → FC	0,117
H1.2 FC → MR	0,034
H1.1 FC → SG	0,758
H1.4 PS → MR	0,002
H1.3 TC → SK	0,471
H1.6 FC → TC	0,014
H1.7 TC → PS	0,111
H2.1 PS → SR	0,041
H2.2 MR * PS → SR	0,100
H3.1 MR → SR	0,035
H3.2 SG → SK	0,711
H3.3 MR → SG	0,04
H3.4 MR → SK	0,855
H3.6 SG * MR → SK	0,549
H3.5 CContext → MR	0,083
H4 SR → SP	0,926
H5 SP → FS	0,005
H6 SR → FS	0,000

With the exceptions of H4, all the other hypotheses show that there are differences between the two groups. Next table (Table 10) summarizes the differences and similarities of the two groups:

Table 10. Results from the analysis of the model for the two groups of learners (university vs. company)

Hypothesis	Similarities	Differences
H1. frequent (FC), timely (TC) and problem solving (PS) communication increases shared goals (SG), shared knowledge (SK) and mutual respect (MR)	- frequent communication (FC) increases shared goals (SG). - timely communication (TC) increases shared knowledge (SK). - timely communication (TC) increases problem solving communication (PS). - the use of email and social media as a communication channel (Channel) increases the frequency of communication (FC).	- frequent communication (FC) has a positive effect on mutual respect (MR) only in the case of learner who have take the course with a company. - the relationship between problem solving (PS) and mutual respect (MR) is strong in the case of university students, while it is statistically insignificant in the case of company learners.
H2. Problem solving communication (PS) has a positive effect on the quality of relationships (SR)	- the hypothesis is validated for both groups.	- this relationship is statistically stronger in the case of learners who have taken the course with an university.
H3. Shared goals (SG), shared knowledge (SK) and mutual respect (MR) increase the quality of relationships (SR)	- mutual respect (MR) increases shared goals (SG).	- the relationship between MR and SR is statistically significant only in the case of university students.
H4. Satisfactory relationships (SR) increases the satisfaction with the online platform (SP)	- this relationship is statistically significant for both groups.	
H5. SP increases learner's final satisfaction with the course (FS).	- the hypothesis is validated for both groups.	- The relationship between SP and FS is statistically higher in the case of company students (0,66), then in the case of university students (0,33), $p < 0,05$ in both cases.
H6. High-quality relationships (SR) increase learner's final satisfaction with the course (FS).	- this hypothesis it is validated for both groups.	- SR's effect on FS is higher in the case of university students (0,62 vs 0,30); $p < 0,05$ in both cases.
Moderating effects: H2.1 MR * PS → SR H3.6 SG * MR → SK	- the moderating effects are statistically significant for both groups.	

4.3.2. Results teachers

Correlations between latent variables are lower then the square root of the corresponding AVE. (Table 11). Therefore, discriminant validity, evaluated according to Fornell-Larcker criterion (Fornell and Larcker, 1981) is met in the case of the analysis of teacher's sample too.

Table 11. Correlation among latent variables for the model applied to teachers' sample

	CContext	Channel	FC	FS	MR	PS	SG	SK	SK * MR	SP	SR	TC
CContext	0,86											
Channel	-0,24	0,73										
FC	-0,37	0,52	0,79									
FS	-0,12	0,14	0,25	1,00								
MR	-0,38	0,47	0,61	0,26	0,85							
PS	0,02	0,17	0,44	0,01	0,33	0,73						
SG	-0,29	0,35	0,53	0,08	0,67	0,35	0,73					
SK	-0,25	0,36	0,50	0,22	0,76	0,23	0,68	0,84				
SP	-0,20	0,09	0,34	0,12	0,39	-0,07	0,44	0,39	0,44	0,88		
SR	-0,49	0,22	0,49	0,31	0,63	0,17	0,43	0,57	0,67	0,44	0,75	
TC	0,07	0,37	0,59	0,17	0,37	0,60	0,31	0,44	0,44	0,06	0,36	0,75

Internal consistency was measured by Cronbach's alpha and by Composite Reliability (Table 12). Overall, Cronbach's alpha takes values greater then the recommended 0,7 (Cronbach, 1951; Nunally & Bernstein, 1994), with the exception of course context (CContext) (0,67) and problem solving communication (0,68). According to Nunally (1978), a Cronbach's alpha above 0,5 indicates that a measure of internal reliability is acceptable. Composite reliability and items communalities take values higher than the 0,5 threshold. Finally, for all variables AVE take values higher then the recommended 0,5.

Table 12. Quality Criteria Overview Teachers

	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
CContext	0,74	0,85		0,67	0,74	
Channel	0,54	0,82		0,73	0,54	
FC	0,63	0,87	0,27	0,81	0,63	0,18
FS	1,00	1,00	0,10	1,00	1,00	-0,01
MR	0,73	0,93	0,37	0,90	0,73	0,26
PS	0,54	0,81	0,36	0,68	0,54	0,20
SG	0,53	0,85	0,45	0,77	0,53	0,24
SK	0,71	0,92	0,68	0,90	0,71	0,36
SP	0,78	0,94	0,19	0,91	0,78	0,15
SR	0,57	0,87	0,61	0,81	0,57	0,12
TC	0,57	0,84	0,34	0,76	0,57	0,19

Means of 500 resampling bootstrap (Table 13) were used to size up statistical significance of the analyzed model, in the case of teacher's sample too. T-values exceeded the 1,96 limit value (95% confidence interval), with the exceptions of the relationships between problem solving communication and shared knowledge (PS → SK, t = 1,78) and satisfaction with the platform and teacher's final satisfaction with his job (SP → FS, t =0,011). Therefore, H5 is not validated.

Table 13. Total Effects Teachers (Mean, STDEV, T-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
H0: CContext → SR	-0,09	-0,10	0,06	0,06	1,63
H1.5: Channel → FC	0,52	0,56	0,11	0,11	4,74
H1.: FC → MR	0,61	0,62	0,12	0,12	4,99
H1.4: FC → TC	0,59	0,60	0,13	0,13	4,44
H3.5: MR → SG	0,67	0,68	0,07	0,07	9,74
H3.4: MR → SK	0,73	0,73	0,09	0,09	8,43
H3.1 MR → SR	0,52	0,52	0,10	0,10	5,04
H1.3: PS → SK	-0,21	-0,22	0,12	0,12	1,78
H3.3: SG → SK	0,33	0,32	0,13	0,13	2,61
H3.2: SK → SR	0,26	0,26	0,17	0,17	1,55
H5: SP → FS	-0,02	0,002	0,24	0,24	0,11
H6: SR → FS	0,31	0,33	0,13	0,13	2,49
H4: SR → SP	0,44	0,46	0,13	0,13	3,47
H1.5: TC → PS	0,60	0,63	0,10	0,10	6,12
H1.2: TC → SK	0,15	0,16	0,10	0,10	1,45

Pseudo t-statistics from the bootstrapping procedure was used to determinate path values. Items loaded significantly (Figure 21) on their latent construct ($p < 0,05$), with the exceptions of H5 (SP → FS). H2 (PS → SR) was not taken into account for this model, as it has shown a very low load during the bootstrapping procedure. Also, there was not found moderating effects with statistical significance for this model.

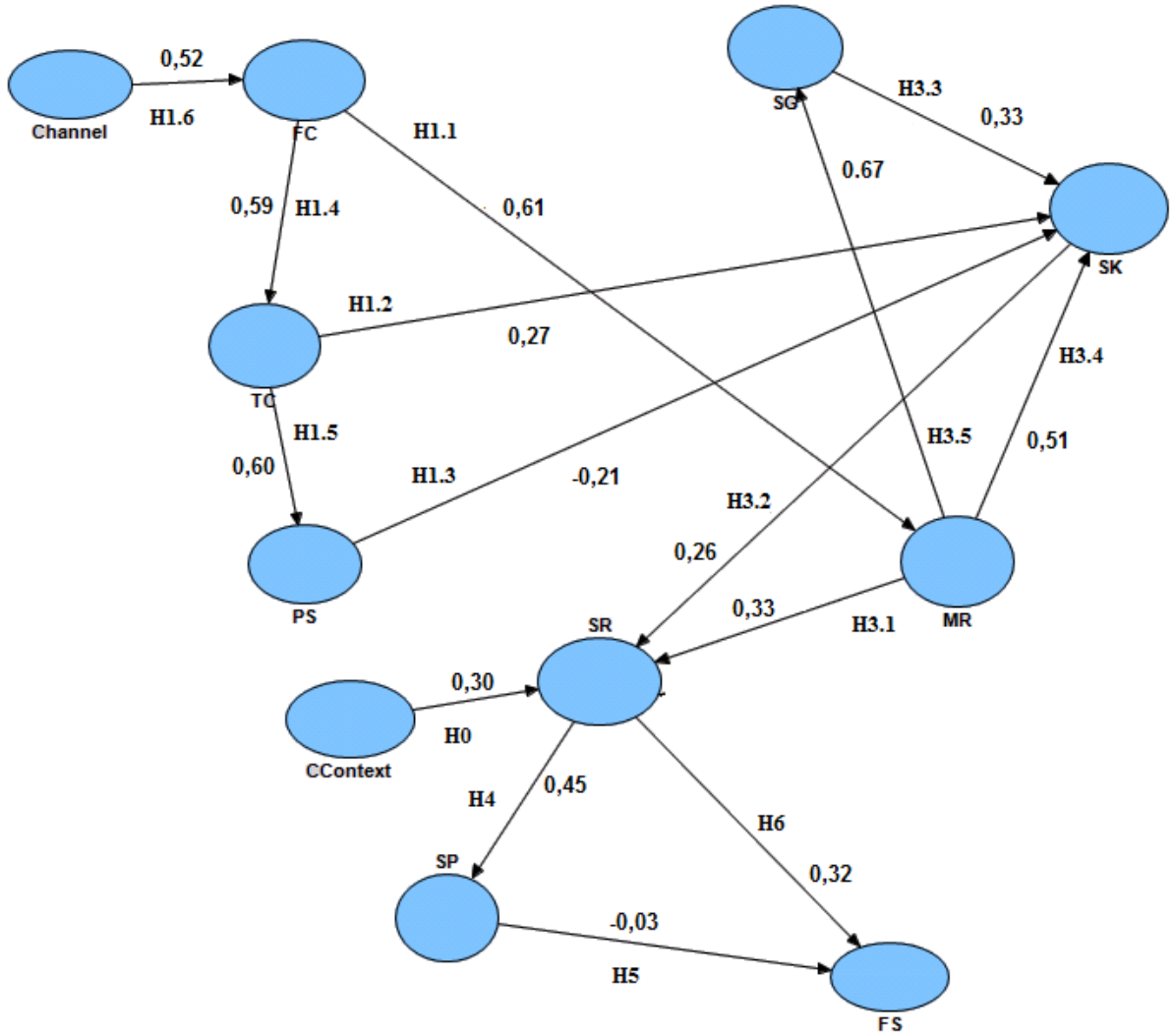

Figure 21. The model proposed for analyzing teachers' sample and the results of PLS algorithm calculation (path values).

All the indicators loading on their construct are higher than all of its cross loadings with other constructs (Table 14). The indicators related to the interaction between teachers and students showed a very low load on the latent variables of communication dimensions (FC, TC and PS), so were dropped. This does not means that the communication between the teacher and student is not important, but it is frequent in e-learning-based courses for teachers to be more involved in the preparation and presentation of educational resources, while another person, usually a tutor, communicates with students in order to solve their problems and doubts.

Table 14. Cross Loading Table Teachers[15]

	CContext	Channel	FC	FS	MR	PS	SG	SK	SP	SR	TC
DOC	0,78	-0,21	-0,07	-0,10	-0,21	0,11	-0,003	0,04	0,06	-0,32	0,25
FCAS	-0,29	0,40	0,86	0,21	0,55	0,52	0,62	0,46	0,35	0,47	0,63
FCB	-0,34	0,48	0,78	0,16	0,47	0,15	0,30	0,42	0,31	0,29	0,30
FCC	-0,24	0,42	0,64	0,27	0,36	0,06	0,11	0,18	0,03	0,27	0,17
FCTS	-0,34	0,41	0,89	0,18	0,53	0,53	0,52	0,47	0,31	0,49	0,64
MRAS	-0,37	0,39	0,57	0,16	0,90	0,47	0,69	0,69	0,29	0,60	0,38
MRB	-0,24	0,33	0,59	0,15	0,80	0,26	0,54	0,61	0,34	0,54	0,37
MRC	-0,30	0,43	0,43	0,33	0,87	0,13	0,46	0,60	0,30	0,54	0,26
MRS	-0,27	0,33	0,23	0,25	0,75	0,07	0,45	0,55	0,38	0,43	0,07
MRTS	-0,42	0,48	0,68	0,27	0,93	0,36	0,66	0,75	0,36	0,60	0,41
Meetings	0,19	0,63	0,33	0,02	0,13	0,22	0,13	0,09	0,05	0,03	0,33
OS	-0,12	0,14	0,25	1,00	0,27	0,04	0,08	0,22	0,12	0,31	0,17
Institution	0,92	-0,20	-0,49	-0,11	-0,41	-0,04	-0,41	-0,38	-0,30	-0,50	-0,06
PSAS	0,11	0,18	0,33	-0,13	0,16	0,86	0,20	0,02	0,16	0,02	0,53
PSB	-0,03	0,24	0,42	0,03	0,38	0,92	0,46	0,30	0,07	0,20	0,56
PSC	-0,23	-0,02	0,18	0,25	0,19	0,36	0,04	0,13	-0,09	0,43	0,19
PSTS	0,10	-0,02	0,32	-0,01	0,22	0,66	0,18	0,22	-0,09	0,05	0,39
Phone	-0,04	0,65	0,17	-0,04	0,28	0,14	0,10	0,17	0,05	0,10	0,25
SGAS	-0,14	0,34	0,42	-0,07	0,48	0,35	0,84	0,53	0,21	0,34	0,35
SGB	-0,33	0,36	0,57	0,06	0,62	0,32	0,89	0,68	0,29	0,37	0,31

[15] The meaning of the abbreviations from the Table 15 is explained in the Glossary of Abbreviations from the Cross Loading Tables page 105.

	CContext	Channel	FC	FS	MR	PS	SG	SK	SP	SR	TC
SGC	-0,31	0,18	0,32	0,17	0,49	0,01	0,62	0,42	0,48	0,35	0,13
SGS	-0,32	0,12	0,27	0,09	0,39	0,07	0,54	0,22	0,50	0,33	-0,11
SGTS	-0,001	0,22	0,28	0,08	0,43	0,43	0,71	0,50	0,25	0,20	0,31
SKAS	-0,13	0,28	0,46	0,06	0,65	0,30	0,68	0,89	0,51	0,56	0,52
SKB	-0,26	0,37	0,54	0,07	0,70	0,28	0,67	0,82	0,24	0,37	0,35
SKC	-0,27	0,29	0,39	0,33	0,63	0,04	0,38	0,80	0,21	0,44	0,29
SKS	-0,26	0,24	0,22	0,17	0,53	0,14	0,44	0,78	0,23	0,51	0,23
SKTS	-0,19	0,32	0,46	0,31	0,68	0,20	0,64	0,91	0,41	0,55	0,41
SM	-0,48	0,78	0,49	0,20	0,48	0,17	0,37	0,37	0,10	0,32	0,38
SPEU	-0,23	0,07	0,29	0,24	0,38	-0,12	0,42	0,41	0,92	0,44	0,10
SPF	-0,17	0,03	0,30	-0,01	0,28	-0,06	0,36	0,34	0,85	0,42	0,03
SPH	-0,14	0,07	0,20	-0,04	0,30	-0,08	0,34	0,26	0,80	0,29	-0,01
SPO	-0,19	0,14	0,38	0,13	0,40	0,05	0,42	0,36	0,96	0,42	0,06
SWAS	-0,30	0,22	0,42	-0,03	0,53	0,34	0,46	0,38	0,20	0,70	0,34
SWB	-0,33	0,32	0,59	0,30	0,60	0,19	0,39	0,61	0,41	0,72	0,37
SWC	-0,38	0,16	0,16	0,21	0,39	0,09	0,24	0,36	0,24	0,76	0,18
SWS	-0,53	0,13	0,28	0,30	0,37	-0,004	0,19	0,38	0,37	0,81	0,26
SWTS	-0,30	0,03	0,39	0,29	0,50	0,07	0,37	0,41	0,39	0,75	0,22
Skype	-0,17	0,86	0,42	0,13	0,41	0,01	0,31	0,33	0,17	0,19	0,14
TCAS	0,08	0,29	0,58	0,17	0,29	0,60	0,31	0,33	0,06	0,25	0,88
TCB	0,14	0,29	0,32	0,22	0,31	0,36	0,09	0,42	0,001	0,36	0,71
TCC	0,06	0,30	0,21	0,24	0,22	0,19	-0,12	0,24	-0,08	0,29	0,56
TCTS	-0,05	0,31	0,54	-0,07	0,32	0,54	0,45	0,37	0,12	0,28	0,84

4.3.3. Conclusions from the empirical analysis of the two samples: students and teachers

The empirical analysis of the two models reveals similarities but also differences regarding the validation of the hypotheses. Table 15 offers an overview of the results of the six tested hypotheses for students and teachers.

Table 15. Validated hypotheses for the two models

Hypothesis	Students	Teachers
H1. Frequent (FC), timely (TC) and problem solving (PS) communication will positively influence the three relationship dimensions, shared goals (SG), shared knowledge (SK) and mutual respect (MR)	YES - FC increases SG - FC has a positive effect on MR - TC increases SK - PS increases MR	YES - FC increases MR - TC increases SK
H2. Problem solving (PS) communication has a positive impact on the quality of relationships (SR) in e-learning contexts.	YES	NO
H3. Relationships based on shared goals (SG), shared knowledge (SK) and mutual respect (MR) increase students' and teachers' satisfaction with the work of other profiles (SR) involved in te e-learning process.	YES - MR increases SR	YES - MR and SK increase SR
H4. High-quality relationships (SR) have a positive effect on learners' and teacher's satisfaction with the online platform (SP).	YES	YES
H5. Learners' and teachers' satisfaction with the online platform (SP) has an impact on learner's satisfaction with e-learning-based course and on teachers' satisfaction with his job (FS).	YES	NO
H6. High-quality relationships (SR) increase learners' and teachers' final satisfaction (FS)	YES	YES

CHAPTER 5: CONCLUSIONS AND FURTHER RESEARCH AREAS

5.1. Conclusions

5.2. Conclusions Regarding Relational Coordination Mechanisms

5.3. Limitations and Further Research Areas

5. CONCLUSIONS AND FURTHER RESEARCH AREAS

5.1. Conclusions

Internet and new technologies have brought a radical change in education. E-learning and mixed-learning is increasingly being adopted in formal education and corporate training all over the world. The advantages of e-learning, such as the possibility to extend education to major groups of people and the elimination of time and place barriers in the learning process, have increased its attractiveness as a form of education. But, e-learning also brings new challenges, such as the increase of worldwide competition between educational institutions, the need of increasing retention rates and the need of addressing quality issues.

Quality standards have been introduced in e-learning. These standards usually focus on tangible dimensions of the learning system, such as technology, curriculum and study programme, staff recruitment, support system to the student and assessment. Even though these dimensions are important, they are not a sufficient condition, as e-learning quality depends on properly manage relation dynamics between different stakeholders. E-learning also presents several circumstances, such as, task interdependence, uncertainty, time restrictions and tacit knowledge. As a consequence, e-learning institutions need to develop mechanisms in order to deal with the new context and achieve a learning process of a better quality.

In this research, the relational coordination has been applied to prove high levels of satisfaction for students with online courses and for e-learning teachers with their job. This study contributes to the evaluation of coordination mechanisms in e-learning. Our research tries to empirically validate if the use of the relational coordination model can explain best results in terms of students' and teacher's final satisfaction in e-learning.

This study contributes to the literature by putting into relation and validating from an empirical point of view the effects of the relational coordination in e-learning. This kind of analysis is important, since there are no studies that put together the communication and relational dimensions of the relational communication model in the same empirical analysis.

The main conclusions of this research from the tested hypothesis are:

- Communication dimensions of the relational coordination model have a positive impact on the relation dimensions (H1).
- The communication channel influences the frequency of communication (H1).

- A problem solving communication increases the quality of relationships in the case of students (H2).

- Relationships based on mutual respect have a positive impact on the quality of relationships for both students and teachers (H3).

- Even though communication and relational dimensions may not have a direct impact on the quality of relationships, it is important to take all of them in consideration because mutual adjustment between these dimensions takes place during the process (H1 and H3).

- Problem solving and mutual respect are important dimensions, as they showed a statistical direct impact on the quality of relationships (H2 and H3) and, in the case of students, they are moderator variables.

- Satisfactory relationships increase learners' and teachers' satisfaction with the online platform used in the e-learning process (H4).

- Learner's satisfaction with the platform increases his final satisfaction with the e-learning-based course (H5). The importance of technology increases in the case of learners that are taking the course with an e-learning private company.

- Finally, we can conclude that high-quality relationships, based on shared goals, shared knowledge and mutual respect, reinforced by frequent, timely and problem solving communication, increase final learner's satisfaction with e-learning and final teacher's satisfaction with his job (H6).

This research proves that the relational coordination model can help public and private institution to better coordinate different stakeholders in order to reach quality and effectiveness in e-learning processes. Results show that by implementing relational coordination mechanisms institutions can achieve best results in terms of students' and teachers' satisfaction.

5.2. Conclusions Regarding Relational Coordination Mechanisms

In this study, we have built an exploratory model that tries to offer an explanation of best results in e-learning processes. Even though, the phenomenon investigated is relatively new and further investigations are needed, from the results we can draw some conclusions that can help e-learning institutions in the development of relational coordination mechanisms. The next figure shows relational coordination mechanisms for e-learning processes as resulted from the tested hypothesis and Gittell's (2011) relational model of organizational change:

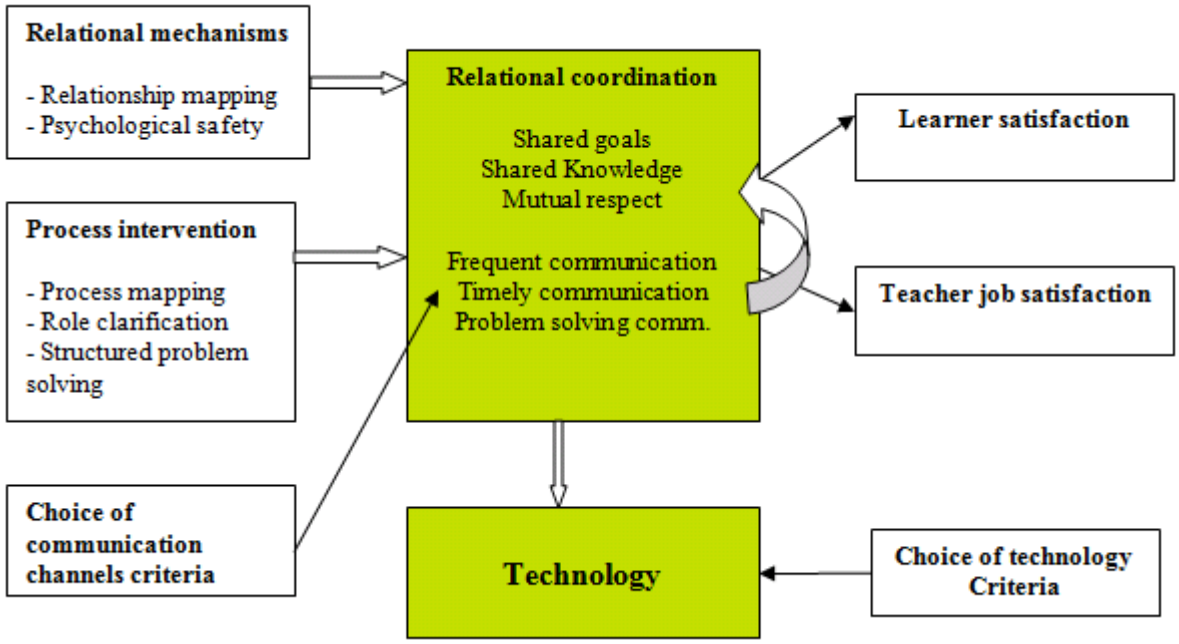

Figure 22. Relational coordination mechanisms of e-learning (adapted from Gittell, 2011)

When developing relational coordination mechanisms, institutions should consider:

- E-learning must be considered as a process that connects all the participants.
- Identify and map the e-learning and e-teaching processes that are taking place.
- Indentify other processes that can have an impact of the two types of processes mentioned above, such as, administration and support processes.
- Clarify roles and identify the group of stakeholders that are participating in the e-learning process.
- Establish criteria for the choice of technology. Results of our research have shown that learner's satisfaction with the technology used in the process affects its final satisfaction with e-learning (H5). They also shown that technology has a higher impact on the final satisfaction of students taking online courses with private companies than for university students. In the case of teacher's, it seems that technology does not have an impact on its job satisfaction. Institutions must choose the technology according to institution's resources and learning purposes and that it is satisfactory for students and fits the needs of participants in the e-learning process. The relational coordination mechanisms developed by institutions must also be taken into account when choosing the technology, as results show the quality of relationships has an impact on student's and teacher's satisfaction with technology.

- Institutions must also set criteria for the choice of the communication channels. Study's results have shown that the use of some channels increase the frequency of communication (H1). In the case of students, social media and email are the channels that increase the frequency of communications, while, for teachers, social media and skype have the highest load. These means that institutions must identify the needs of communication of each group and the level of frequency required to reach best results.

- Measure and asses relational coordination in order to identify variations and areas of improvement.

- Create a space of psychological safety, as participants need it for finding the best ways of communicating and relating.

- Develop plan for action to implement the developed relational coordination mechanisms.

5.3 Limitations and Further Research Areas

Although the results of this research are relevant for the improvement of quality in e-learning, the study presents some limitations. First, the study should be extended to other group of stakeholders at e-learning institutions (e.g. management, administration staff and technical support staff).

Secondly, the study should be extended to higher samples of students and teachers. In the case of teachers, we collected 38 answers and we need a higher sample to compare statistically teachers who give e-learning-based courses at universities with those working for private companies.

One of the most important limitations is the fact that we do not know the internal organization of institutions where the interviewed students and teachers are taking and give the online courses. Teaching methods and internal organization of institutions varies widely in the e-learning market. For example, in some courses, students must do work group in some tasks, while in other courses only student-interaction is met. We also can find differences in the working profiles and their tasks at institutions. These differences can affect the relationships between the profiles working at e-learning institutions and their relationships with students. In our questionnaire, we included several profiles that were dropped because they show a low load on the latent variable, such as, classmates, in the case of students' analyze, and students for communication latent variables, in the case of teachers. A statistical analyze of samples, where teaching methods and the internal organization of institutions are

previously known, would help us to better determinate the importance of each of these roles in e-learning contexts.

Finally, this study has been conducted mainly in a geographic context and it should be extended to samples from a wider area.

GLOSSARY

Glossary[16]

A

ASP (application service provider): A company that supplies software applications and/or software-related services over the Internet. It gives to its clients the possibility to use software applications using a rental model or a periodic payment.

Asynchronous learning: Learning in which interaction between instructors and students occurs intermittently with a time delay. Examples are self-paced courses taken via Internet or CD-ROM, online discussion groups and email.

C

CBL (computer-based learning): an umbrella term for the use of computers for in both instruction and management of the teaching and learning process. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching and learning purposes.

Cloud computing: Capability to access data from anywhere rather than being tied to a particular machine.

CML (computer-mediated learning): See CBL.

CMS (Content Management System): A centralized software application or set of applications that facilitates and streamlines the process of designing, testing, approving, and posting e-learning content, usually on websites.

D

Digital Literacy: The ability to use the information and communication technology to find, evaluate, create, and communicate information.

Distance education: Delivery of learning material using both print and electronic media, the teacher and the learner being separated by location and time.

[16] The definitions of these terms are taken and adapted from ASTD's website; PLS Management Ramboll, 2004; OECD, 2007; Dondi and Moretti, 2007; Elbech and Mandernach, 2009, Coll and Monereo, 2008; Brennan, 2001; Martínez Caro, 2006; O'Mailley, 2003.; Horizon Report, 2014 and Gittell, 2011.

E

E-learning: The learning process supported by information and communication technologies that enable the sharing of knowledge and the communication among the participants involved in the process.

L

LCMS (Learning Content Management System): A software application used to create, store, assemble and deliver personalized e-learning content in the form of learning objects.

Learning portal: Any website that offers learners and organizations consolidated access to learning and training resources.

LMS (Learning Management System): A software application on a server connected to a computer network, Internet or Intranet, specifically designed to facilitate access to learning materials and communication between students and teachers and among students themselves. The LMS register users, tracks courses in a catalogue, records data from learners; and provides reports to management.

Learning platform: The set of hardware, software and support services that enables users to submit and retrieve educational content inside and outside the classroom.

M

MLE (Managed Learning Environment): A software application that includes registration, assessment, administrative and other processing applications.

Mobile learning: Any sort of learning that happens when the learner is not on a fixed, predetermined location, or learning that takes place via mobile devices as smartphones, tablets, personal digital assistants (PDAs,) or laptop computers.

MOOC (massive open online course): A type of online course aimed at large-scale participation and open access via the web. MOOCs are a recent development in the area of distance education, and a progression of the kind of open education ideals suggested by OER (see definition). MOOCs typically do not offer credits awarded to paying students at schools, but assessment of learning may be done for certification.

O

OER (Open Educational Resources): Digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research. OER includes learning content, software tools to develop, use and distribute content, and implementation resources such as open licenses.

Online education: see online learning.

Online learning: Learning delivered by web-based or Internet-based technologies.

Open source system: Generally, software for which the original program instructions, the source code, is made available so that users can access, modify and redistribute it. Moodle is an example of open source system used in e-learning.

R

Relational coordination: The coordination of work through communication and relationships of shared goals, shared knowledge and mutual respect.

S

Synchronous learning: A real-time, instructor-led online learning event in which all participants are logged on at a same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and teachers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephony, or two-way live broadcasts.

T

Tacit knowledge: Knowledge that people possess and can use, but that is difficult to communicate and share with others by means of writing or verbalizing it. This type of knowledge consists of mental models, patterns, skills, perceptions, experiences, believes, values or know-how.

TQM (Total Quality Management): A management approach for an organization, centred on quality, based on the participation of all its members and aiming at long term-success through customer satisfaction, and benefits to all members of the organization and to society.

V

VAS (value-added services): In the context of the e-learning industry, VAS include custom training needs assessment and skill-gap analysis, curriculum design and development, pre- and post-training mentoring and support, reporting and tracking tools and other services.

Virtual learning: A learning environment where teacher and student are separated by time and space, or both.

Virtual university: Is a term used to describe several different types of university which offer their courses in e-learning format.

VLE (Virtual Learning System): A virtual environment accessed by learners and teachers to access or post information, learning resources and communication tools and activities. Often it is used with the same meaning as LMS, especially in Higher Education. See LMS definition.

W

WBL (web-based learning): Delivery of educational content via a Web browser over the public Internet, a private intranet or an extranet. Web-based learning often provides links to other learning resources such as references, email, bulletin boards, and discussion groups. WBL also may include a facilitator who can provide course guidelines, manage discussions boards, deliver lectures, and so forth.

GLOSSARY OF ABBREVIATIONS FROM THE CROSS LOADING TABLES

Glossary of Abbreviations from the Cross Loading Tables

C

CContext: the context of the online course, such as the duration and the institution that imparts the course.

Channel: the communication channel used during the e-learning process.

D

DOC: the duration of the online course.

F

FC: frequent communication.

FCAS: the frequency of communication with the administration staff.

FCB: the frequency of communication of teachers with their boss.

FCC: the frequency of communication of teachers with their colleagues.

FCT: the frequency of communication of students with their teacher.

FCTS: the frequency of communication with the technical support staff.

FS: final satisfaction with the online course.

M

MR: mutual respect.

MRAS: mutual respect with the administration staff.

MRB: mutual respect with theacer's boss.

MRC: mutual respect wit teacher's colleagues.

MRT: mutual respect with the teacher.

MRTS: mutual respect with the technical support staff.

O

OS: overall satisfaction with the online course.

OSAM: overall satisfaction with the assessment method

OSMQ: overall satisfaction with the quality of educational material.

OSMU: overall satisfaction with material utility.

OSSAT: overall satisfaction with the self-assessment tools.

OSTW: overall satisfaction with teacher's work.

P

PS: problem solving communication.

PSAS: problem solving communication with the administration staff.

PSB: problem solving communication with teacher's boss.

PSC: problem solving communication with teacher's collegues.

PST: problem solving communication with the teacher.

PSTS: problem solving communication with the technical support staff.

S

SG: shared goals.

SGAS: shared goals with the administration staff.

SGB: shared goals with teacher's boss.

SGC: shared goals with teacher's collegues.

SGT: shared goals with the teacher.

SGTS: shared goals with the technical support staff.

SK: shared knowledge.

SKAS: shared knowledge with the administration staff.

SKB: shared knowledge of the teacher with his boss.

SKC: shared knowledge of the teacher with his colleagues.

SKT: shared knowledge with the teacher.

SKTS: shared knowledge with the technical support staff.

SM: social media.

SPEU: satisfaction with the ease of use of the online platform used to impart the online course.

SPF: satisfaction with functionalities of the online platform used to impart the online course.

SPH: satisfaction with the help offered by the online platform used to impart the online course.

SPOS: overalls satisfaction with the online platform used to impart the online course.

SR: satisfaction with the relationships that students and teachers have with other participants in the e-learning process.

SWAS: satisfaction with the work of administration staff.

SWB: satisfaction with the work of teacher's boss.

SWC: satisfaction with the work of teacher's colleagues.

SWT: satisfaction with the work of teacher.

SWTS: satisfaction with the work of technical support staff.

T

TC: timely communication.

TCAS: timely communication with the administration staff.

TCB: timely communication with the boss.

TCC: timely communication wit teacher's colleagues.

TCT: timely communication with the teacher.

TCTS: timely communication with the technical support staff.

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APPENDIX

APPENDIX

Appendix A. Students' survey[17]

1. Please mark whether the course that you are registered in is given by a University or a Private Company.

University	Private Company

2. Please indicate your personal situation, in these options:

Sex	
F	
M	
Age	
<18	
18-25	
25-35	
35-45	
45-55	
55-65	
>65	
Country of origin	
Spain	
USA	
Other	
Duration of the online course	
< 1 month	
1 month – 3 months	
3 months-6 months	
6 months – 1 year	
> 1 year	
Is this your first online course?	
Yes	
No, I attended other course(s)	

[17] All the questions that include the choice option other(s), gave the interviewed students the option to specify which country, communication channel, online platform, profile, they refer to when they mark this option.

3. Please mark the method of the course:

Synchronous: The content of the course is transmitted when the student and the teacher are both connected to the platform.	
Asynchronous: The content is shared without the need for the teacher and the student to coincide (in time).	
Mixed (synchronous and Asynchronous)	

4. Please mark the platform that the University/Company is using to impart the course:

WebCT	
Angel Learning	
Moodle	
Other	
I don't know	

5. What other means (channels) of communication do you use to contact the University/Company?

	never	rarely	occasionally	often	constantly
Phone					
Personal meetings at the University/Company					
Your personal email adress					
Skype					
Social Media (Facebook, Twitter, etc.)					
Other					

6. Appreciate your satisfaction with the platform that the University/Company is using to impart the course:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Ease of use				
Functionality (software features)				
Help (manuals, support)				
Overall satisfaction				

7. Which of these profiles have the same goals concerning the course as you and how often?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Administration staff					
Others					

8. How many of these profiles (and how often do they) know about your activities in the course?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Administration staff					
Technical support staff					
Others					

9. Which of these profiles respects the effort you make, in order to acquire the knowledge imparted in the course?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Administration staff					
Technical support staff					
Others					

10. With which of these profiles do you often communicate?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Administration staff					
Technical support staff					
Others					

11. Do the people belonging to these areas need to give you information at specific times?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Administration staff					
Technical support staff					
Others					

12. When there are any problems with the course, which profiles work on solving them?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Administration staff					
Technical support staff					
Others					

13. How would you grade your satisfaction with the work made by the following profiles?

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Teacher				
Classmates				
Myself				
Administration staff				
Technical support staff				

14. Which of these profiles assess you during the course?

	never	rarely	occasionally	often	constantly
Teacher					
Classmates					
Myself					
Others					

15. Appreciate your satisfaction with the course regarding the following aspects:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Material quality (texts, manuals, video, etc.)				
Material utility				
Teacher's work				
Assessment method				
Self-assessment tools				

Overall satisfaction				

Appendix B. Teachers' Survey[18]

1. Please mark whether you work or collaborate with a University or a Private Company.

University	Private Company

2. Please indicate your personal situation, in these options:

Sex	
F	
M	
Age	
<18	
20-30	
30-40	
40-50	
50-65	
>65	
Country of origin	
Spain	
USA	
Other	
Duration of the online course	
< 1 month	
1 month – 3 months	
3 months-6 months	
6 months – 1 year	
> 1 year	
Is this the first online course you teach?	
Yes	
No, I taught other course(s)	
Experience in online training	
< 1 year	
1 year – 3 years	
3 years -5 years	
5 years – 10 years	
> 10 years	

[18] In the case of all questions that have as a choice option other(s), teachers were given the possibility to specify which country, communication channel, online platform, profile they are working with, they refer to.

3. Please mark the method of the course you give:

Synchronous: The content of the course is transmitted when the student and the teacher are both connected to the platform.	
Asynchronous: The content is shared without the need for the teacher and the student to coincide (in time).	
Mixed (synchronous and Asynchronous)	

4. Please mark the platform that the University/Company is using to impart the course:

WebCT	
Angel Learning	
Moodle	
Other	
I don't know	

5. What other means (channels) of communication do you use in your teaching work?

	Never	rarely	occasionally	often	constantly
Phone					
Personal meetings at the University/Company					
Your personal email address					
Skype					
Social Media (Facebook, Twitter, etc.)					
Other					

6. Appreciate your satisfaction with the platform that the University/Company is using to impart these courses:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Ease of use				
Functionality (software features)				
Help (manuals, support)				
Overall satisfaction				

7. Which of these profiles have the same work goals as you and how often?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					
Others					

8. How many of these profiles (and how often do they) know about the work you are doing in the company?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					
Others					

9. Which profiles respect the work you are making?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					
Others					

10. With which of these profiles do you often communicate?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Administration staff					
Technical support staff					
Others					

11. Do the people belonging to these areas feel the need to give you information at specific times?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Administration staff					
Technical support staff					
Others					

12. When there are any problems with the course, which profiles work on solving them?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					
Others					

13. How would you grade your satisfaction with the work made by the following profiles?

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
My Boss				
Students				
My colleagues				
Myself				
Administration staff				
Technical support staff				

14. Which of these profiles decide the carrying out or development of your work?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					

15. Which of these profiles assess the work you are doing?

	Never	rarely	occasionally	often	constantly
My boss					
Students					
My colleagues					
Myself					
Administration staff					
Technical support staff					
Others					

16. How would you grade your satisfaction with your work?

Very dissatisfied	Dissatisfied	Satisfied	Very satisfied