

ELearning Acceptance in Hospitals:
Continuing Medical Education of
Healthcare Professionals

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Γηράσκω αεί διδασκόμενος
(As I age, I constantly learn more)

Socrates 469 - 399 BC

Board

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Abstract

eLearning provides healthcare professionals an interesting alternative of participating to Continuing Medical Education (CME) activities. It offers the possibility to attend courses at a distance, and it allows creating personal learning schedules without needing to leave the job or the family. Hospitals can choose to organize CME activities for their employees and therefore may also opt to offer eLearning activities.

The research studies eLearning acceptance in the CME of healthcare professionals in hospitals, it wants to compare the findings to eLearning acceptance in the corporate sector and to create an eLearning Readiness Index for continuing education managers devoted to the organization of educational activities for healthcare professionals who work in hospitals.

The research is based on a theory of eLearning acceptance called eLearning Acceptance Map (MeLA), which aims at understanding phenomena of acceptance and abandonment of eLearning activities. MeLA is based on the Diffusion Theories, on the Technology Acceptance Model and on Learner Acceptance.

The study leads to the creation of an eLearning Readiness Index for the Continuing Medical Education of healthcare professionals (eCMERI) with the purpose of helping CME managers to promote, organize and decrease the number of dropouts from eLearning activities.

A first investigation on the CME guidelines in 24 European Countries and in the USA was carried out, revealing that even though eLearning is an accepted way of participating to CME activities, few specific guidelines on its use are found. The second investigation

studied the acceptance of eLearning in hospitals; the results were compared to the acceptance of eLearning in the corporate sector.

In conclusion, the hospital sector seems to widely differ from the corporate field as far as an eLearning Readiness Index is concerned; five additional actions were found, showing that hospitals require more complex guidelines to organize and promote eLearning than companies. Furthermore, dissimilar priorities are required to encourage eLearners to participate to the activities, which points out different requirements in the two fields.

Dedicated to Giorgos.

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Chapter 1 - Introduction

The purpose of the doctoral research is to study the acceptance of eLearning in the Continuing Medical Education (from now on CME) of healthcare professionals in hospitals and compare the findings to eLearning acceptance in the corporate sector (CeLeRI, Succi and Cantoni, 2008). A comparison between the two studies is done and new parameters relating to the medical field are revealed. The main contribution of the research lays in the creation of an eLearning Readiness Index for continuing education managers devoted to the organization of educational activities for healthcare professional who work in hospitals. No previous work on the topic was identified throughout the literature review.

The first step was to study the CME guidelines of the Medical Associations and Health Ministries in Europe and in the USA to analyze the presence of eLearning in the context. This first research revealed that eLearning is discussed in the National guidelines and is an accepted way of participating to CME activities in most of the concerned countries. Healthcare professionals can therefore collect continuing education credits or certificates by attending eLearning activities. Once the interest in eLearning in the healthcare sector was verified, the next step was to identify how this type of activity is set up and structured in hospitals. Starting from a model created by Succi and Cantoni (2008) that proposes an eLearning Readiness Index in the corporate context, a literature review was carried out to verify if the parameters of the corporate index occur in the hospital sector and to identify potential new factors. Moreover, a survey was carried out to discover if the parameters apply to hospitals as a particular type of organization, and a new eLearning Readiness Index for the Continuing Medical Education of healthcare professionals in hospitals was created.

The following sections explain the research objectives, the background of the study and present its main results.

1.1 Research objectives

This section briefly explains the context of the research and illustrates its objectives. Furthermore, it clarifies why eLearning in CME (and therefore this study) is important for healthcare professionals.

Hospitals are organizations where various professions meet to interact with their clients (the patients) in order to provide them health care. To achieve high quality services, one common trend is to provide the professionals with continuing medical education activities, with the purpose of allowing them to stay up to date with the latest techniques, theories and technologies in their field.

Electronic learning (eLearning) offers an interesting alternative for healthcare professionals to take part to CME activities. In the busy schedule of health operators, it offers the possibility to attend courses at a distance, allowing the participants to create their own learning schedule without needing to leave their job or families (*anytime, anywhere* principle, Iskanius et al., 2005).

Hospitals can choose to organize CME activities for their employees, and therefore they may opt to offer eLearning activities. The research wants to illustrate which actions are carried out to promote events of this type and wants to compare the corporate and hospital sectors. New parameters related to the medical field are revealed and an eLearning Readiness Index for hospitals is created, which could also help CME managers to organize and promote eLearning activities and improve the learners' satisfaction. The following section presents the background of the research.

1.2 Background

This section briefly explains the work prior to this study. The research is based on a theory of eLearning acceptance called *eLearning Acceptance Map (MeLA)*, proposed by the above mentioned Succi and Cantoni (2008), which aims at understanding phenomena of acceptance and abandonment of eLearning activities. MeLA is based on the Diffusion Theories, on the Technology Acceptance Model and on Learner Acceptance, which are thoroughly examined in Chapter 2. The map is composed of three levels:

- The **components** (*knowledge and commitment*), which correspond to the information learners receive before the eLearning activity starts and the first opinions they collect about the activity.
- The **phases** of the eLearning acceptance process (*preparation, action/start, persistence*), which go from the first information spread to promote the activity, to the decision the learner takes of accepting the event and start attending it, arriving to the choice of participating throughout the whole activity.
- The relevant **variables** (the *eLearner*, the *organizational context* and the *asset*), which correspond to the learners' characteristics, the context that can influence participation, and the way the contents are delivered.

To increase eLearning acceptance in an organizational setting, Succi and Cantoni (2008) concentrate on the above mentioned *preparation phase*, on the *organizational context* variable and on the *knowledge and commitment* components.

As a result, the authors propose a Corporate eLearning Readiness Index (CeLeRI) that reveals 17 eLearning acceptance enabling actions. The index aims at helping learning managers in the organization and promotion of eLearning activities.

The parameters are tested in the following Chapters to clarify if they are applicable in hospitals. The next section describes research questions and hypotheses.

1.3 Research questions and hypotheses

This section presents the research questions and the hypotheses of the study. To conduct the research, the following questions were raised:

- Which actions can hospitals carry out to promote eLearning acceptance?
- How is eLearning acceptance in hospitals structured in comparison to the corporate sector?
- Do the national guidelines have an impact on the eLearning acceptance in Hospitals?

The questions were originated from the results of the corporate eLearning acceptance research and thanks to the issues which rose during the pre-phase described in section 4.2.

These questions are answered in the final chapter. Two hypotheses derive from the above listed questions: a) The eLearning Readiness Index (Succi and Cantoni, 2008) cannot be equally applied to different sectors; in particular differences are expected in the healthcare setting; b) The National guidelines influence the activities of the hospitals. A short description of the hypotheses and their confirmation follows.

a) Hypothesis 1: The eLearning Readiness Index (Succi and Cantoni, 2008) cannot be equally applied to different sectors; in particular differences are expected in the healthcare setting. Succi and Cantoni studied eLearning acceptance in different companies, among which none was healthcare related. Hospitals have particular needs, therefore it might be necessary to:

- Amplify or reduce the eLearning Readiness Index

- Reorganize the index according to the needs of the specific sector

The following two sub-hypotheses derived:

- *Hypothesis 1a: The Corporate eLearning Readiness Index (CeLeRI) needs a reduction or an increase of the number of parameters depending on the sector.*
- *Hypothesis 1b: The parameters can have a different importance ranking.*

b) Hypothesis 2: The National guidelines influence the activities of the hospitals. A sub-hypothesis was derived which is directly related to the National guidelines:

- *Hypothesis 2a: The CME status of a country (obligatory, semi-mandatory or voluntary CME) influences decisions regarding the credits healthcare professionals need to collect.*

The hypotheses and the results are discussed in detail in Chapter 5. The next section illustrates the structure of the dissertation.

1.4 Structure of the dissertation

This section briefly describes the contents of the dissertation. The first Chapter offers an introduction to the research, explaining the objectives and the hypotheses. It offers a general overview of the results and the structure of the chapters.

The second Chapter contains the theoretical background needed to carry out the research, and an extensive literature review, which identifies the parameters for the eLearning Readiness Index in the hospital context. At first, the definitions and origins of eLearning are explained and eLearning is located and defined as part of the CME field. Moreover, the

theories this research is based on are explained (diffusion theories, technology acceptance theories and the eLearning acceptance map). Furthermore the eLearning Readiness Index is presented and finally the parameters used to create an eLearning Readiness Index for CME are identified in the literature.

The third Chapter describes the methodology of the research. At first it illustrates the procedures of the 3 stages of this study: the pre-phase where Medical Associations and Health Ministries were inquired, the pilot phase where the survey was discussed with CME managers and statistics experts, and the main phase where the survey was sent to the main sample. Finally the data collection instruments are described.

The fourth Chapter presents the final results; it starts with the analysis of the pre-phase and the presentation of the outcomes of the first questionnaire, it continues with descriptive statistics of the data collected during the main phase, moreover it offers data analysis with the creation of an eLearning Readiness Index for CME. Finally it offers a comparison between the latter and the corporate eLearning Readiness Index (Succi and Cantoni, 2008). The fifth Chapter illustrates the conclusions of the research.

Chapter 2 - Background

2.1 Introduction

This Chapter starts by explaining general concerns about eLearning (2.2), it continues clarifying more specific issues about the topic (eLearning diffusion in organizations (2.3)), and finally it offers an overview of eLearning in the medical field (2.4).

2.2 ELearning background

This section describes the origins of eLearning, various definitions and their interpretations, and finally it presents several reasons in favor of adopting this type of activity.

2.2.1 Origins

The origins of eLearning can be found in distance education activities which open universities started exploring over 150 years ago. Distance education is composed of asynchronous and asynoptic learning activities, which are being delivered through the use of various technologies like paper (in the middle of the 19th century letters with learning materials were sent by mail), phone, radio, television, et cetera. The following definition thoroughly describes the characteristics of this type of activity:

Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements (Moore and Kearsley, 1996: 2).

Peters (1997) defines four periods of distance learning history: (1) *Preparation: pre-industrial forms*; (2) *Industrial forms: correspondence education*; (3) *Multi-media single*

mode distance teaching universities: “open universities”; (4) Digitalized Learning: distance education on the net. Virtual universities and corporate universities.

Pre-industrial distance education

The first experiments in distance learning were singular and isolated. They go back to the epistles which Saint Paul of Tarsus was sending to the Christian communities in Minor Asia in order to teach them how to conduct a Christian life in an environment that was hostile to their beliefs. Being unable to personally reach all the groups that were born, he was obliged to spread his teachings by using writing and transportation technologies (Peters, 1997). This type of written (asynchronous) communication substituted the face-to-face modality (synchronous) of preaching.

Correspondence instruction

Where industrialization changed technological and social conditions, first approaches to distance education can be found. In the middle of the 19th century, educational systems were not prepared to adapt to new educational needs. However, entrepreneurs (mainly editors) identified these needs and started exploiting new possibilities that era offered through mass production, the large distribution net that had been created, and technologies like the mail service and the railways. Those years a large amount of correspondence schools were born in England, France and Germany, spreading also to other nations and continents. These schools offered workers who were partly cut out from the growing competition of the educational system the possibility to study. In particular two aspects favored the success of these institutions: Nations with large territories like Argentina, Canada, Australia and Russia, could reach parts of their population that were living in isolated areas; Countries like the British Empire or France, which had colonies, were able to offer degrees to all their citizens (Peters, 1997).

Open universities

In the 1970's a new phase started where radio, television and later also audio- and videotapes started being used in education. Their introduction and frequent utilization strongly increased the importance of distance education. Funded by governments, universities began the development of high quality teaching material, which was spread through the mass media. Distance learning started being available for larger groups of adult students, pedagogical experimentations were performed, educational technologies were increasingly being used and open and life-long learning was introduced (Peters, 1997). Table 2.1 shows several examples of open universities that were developed in the seventies, eighties, and nineties, and lists for each one the different structures of distance learning they adopted.

Table 2.1: Distance teaching universities and their media structure (Peters, 2002: 6-7)

<i>Distance teaching university</i>	<i>Typical media structure</i>
University of South Africa	Correspondence university: <u>Printed course material</u> , study guides, tutorial letters.
Open University (United Kingdom)	Distance teaching university: Open access. <u>Pre-prepared course material</u> , course team approach, radio and television broadcasts. Counseling and tutoring in study centers.
FernUniversität (Germany)	Research-based distance teaching university: <u>Pre-prepared course material</u> , video- and audio cassettes, TV broadcasts, tutoring in study centers, seminars.
Central Radio and Television University (China)	Mass-media based distance teaching university: <u>TV- and radio-lectures</u> , several compulsory classes per week. Supplementary printed material.
National University Teleconference Network (USA)	Video-based extension of face-to-face teaching in a college by a consortium of universities: <u>Video-based distance teaching</u> together with textbooks and instructors. Interactive videoconferencing.
Project North (Ontario, Canada)	A teleconferencing-based cooperative distance teaching organization: <u>audio conferencing</u> , audiographic conferencing, videoconferencing and computer conferencing for extended college tuition.

Digitalized Learning

Information and communication technologies are changing the way education is being delivered. The development of virtual learning environments requires new ways to design learning and teaching activities, which must correspond to students' new needs.

Educational processes are changing rapidly, Peters explains several causes, writing that in this new context it is possible to find an increased number of learners with different interests or problems (adult-working students, neglected students, etc.), a change in higher education (new functions, contents and pedagogic structures), globalization and competition with other educational providers. As a consequence changes in the learning and teaching techniques will take place. According to Peters (2002) they have to become more open and learner centered, interactive and flexible, taking care of the student's curriculum and learning strategies.

E-Learning finds its origins during the early 1980s when the first personal computers were available on the market and the use of ICT had increasingly become a normal part of everyday life for a growing number of people. As personal computers became more common, early attempts have been done to develop ICT supported learning processes. This progress far pre-dated the use of internet as a learning medium (Attwell et al., 2003). According to Bates (2005) the first online asynchronous teaching activity started in the early 1980s, with the use of a conferencing software developed by Murray Turoff in 1970. Until the mid 1990s however, due to the slow and expensive internet connections and the lack of user friendly interfaces, such type of activity was only used by a few. The development of the World Wide Web was the main catalyst for the rapid spread of the internet and around 1995 the first web-based university courses started emerging. Various definitions of e-Learning are studied in the next section.

2.2.2 Definition

This section presents several definitions that have been given to eLearning over the years by the various authors. Throughout literature, eLearning (*electronic learning*) has been given various definitions; most of them basically point out that “doing eLearning” means participating to learning activities which involve the use of computers, or more generally ICT, and networks like the internet. This short explanation is, however, very general; several details should be taken care of when defining eLearning.

eLearning can be encountered in several daily activities among which reading online news, receiving weather information on the mobile phone through SMS, reading the help file of an operating system or by exchanging messages with a friend in a chat room. Rossett (2002) says that when digital information and communication tools are integrated into the learning/teaching experience, we enter in the eLearning field.

Rosset, however, does not specify which information and communication tools she is referring to. It is possible to find an accurate list of these elements in the definition proposed by the ASTD Learning Circuits, which describe eLearning as a

term covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, CD-ROM, and more (www.learningcircuits.org/glossary).

The previous two definitions, however, do not talk about the possibilities of *publishing* digital learning contents. If, for example, there is the necessity to create an online course on “First aid” based on a specific book about the topic, there are various ways of publishing the contents: a) the book can be published as a PDF file and made available for download (electronic book); b) it is possible to copy the single chapters into a web site and make them

accessible through a list of links; c) the contents can be proposed online or in a CD/DVD, through the use of animated or interactive tools.

The first two possibilities do not offer any new feature that a printed book does not already provide. While if learning tools are added like for example a decision tree, animations, audio files, or videos, etc., we might be closer to obtaining a course that can provide different learning approaches that paper and other technologies cannot provide (or only with complex and costly solutions). Computers allow the integration of all types of media and to use them in order to create learning activities which otherwise would be too complicated to reproduce. For example in medicine it might be an advantage to show the effects of a certain disease on the skin by using videos, photographs or images. Details that normally can only be seen in a microscope can be gathered and published on a website or on a CD/DVD-Rom, accompanied by text and animations that show how the skin appears in a 1:1 scale or magnified.

A definition that takes into account the use of ICT and describes how eLearning courses should be produced is the one given by the EU documents, which define eLearning as “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” (CEC, 2001: 2).

A definition that thoroughly synthesizes all the previous ones is the following given by Cantoni et al. (2007: 26) who use the definition of eGovernment proposed by the Organization for Economic Co-operation and Development (OECD) and rephrase it to delineate eLearning as being:

- The use of ICTs in education and training;
- Internet (online) education and training;

- The capacity to transform education and training through the use of ICTs.

eLearning activities are hard to be defined because many aspects are involved in their creation. According to these definitions, a correct balance between educational contents and use of ICT is needed to obtain an online course. The next sections want to explain the role of eLearning in the Continuing Medical Education field.

2.3 eLearning and Continuing Medical Education

This section describes the Continuing Medical Education field (from now on CME) (2.3.1), it continues defining eLearning in this context (2.3.2), and it concludes by explaining what eLearning offers to CME participants.

2.3.1 Continuing Medical Education European background

The constant and fast development of new products makes it necessary for professionals of every field to be up to date with the newest techniques, tools, software, therapies, etc, in order to ensure best service to their clients. The process of constantly being up to date with the latest information of one's field is called lifelong learning. Cantoni (2007) defines lifelong learning, taking into consideration that the fast growth of new information is also determined by speed:

Speed is an important characteristic of ICT and the internet. It allows exchanging data at a high rate, and it causes acceleration in the development of products and services. This appears in the educational field, with the necessity for constant updating, and the acquisition of constantly new knowledge and competences. This process is called lifelong learning: learning that takes place throughout life (Cantoni, 2007: 37).

According to Inecco et al. (2005) continuing education has an informative role which corresponds to the acquirement of new theoretical knowledge, or to the substitution of

forgotten or obsolete notions. In the medical field, for example, the knowledge of a new therapy that can cure a certain illness might be crucial to save a life or improve a patient's life quality. This is one of the main reasons why lifelong learning (or CME) is an ethical (and in certain cases a legal) obligation for physicians and other professionals of the field.

The need for physicians to keep their knowledge and skills up to date was obvious since the ancient times of Hippocrates. Cosmacini (2003) declares that ever since good physicians felt the need to improve themselves, they had to continuously be up to date and never stop learning. Today's fast progress in medicine makes the necessity for continuous updating even more significant. According to Halila (2006: 1) "it has been estimated that about half of all medical knowledge is out of date in five years time". This fast advancement creates a need for organized and quality-controlled CME activities for healthcare professionals, and raises issues about the obligatory versus voluntary collection of CME credits (more information on credits and accreditation can be found at the end of this section). CME is one of the three components of medical education, along with undergraduate and graduate education (Campbell et al., 2004). Participating to CME activities helps physicians and other health professionals to remain up to date in their field after having finished university studies. CME is a lifelong educational process to which a medical professional takes part in order to increase and improve his/her knowledge and competences in his/her profession. The UEMS (European Union of Medical Specialists) states that CME

is both a necessity and an obligation, which applies to the medical profession as much as to any other. The educational process lasts throughout the specialist's entire career, beginning with basic undergraduate training, carrying on through the specialist training and extending for the remainder of professional life as Continuing Medical Education (UEMS, 1994: 2).

An exhaustive definition of CME is the one given by Eysenbach et al. (1998) who defines it as

process of lifelong medical learning after undergraduate and postgraduate training, of keeping abreast of the latest developments and technologies of the dynamic and ever-changing field of medicine, both concerning theoretical knowledge and practical skills (Eysenbach et al., 1998: 69-72).

The evolution of medicine makes CME a crucial part of a healthcare specialist's professional life. Accreditation systems are necessary in order to keep track of the attended activities. The following lines explain why and how healthcare professionals are accredited for participating to CME events.

Accreditation

Recognizing the importance of CME, European Medical associations and Health Ministries developed accreditation systems to control the quality of CME events and providers, to assist healthcare professionals in participating to CME activities and in several cases to assess whether or not these activities are being followed. The involved organizations want health professionals to participate to relevant and high quality CME activities. Accreditation credits or points are used in order for the professionals to keep track of their CME activities, and are assigned for the participation to every educational hour or learning module. Different approaches are adopted on the allocation of credits, for example 1 credit could correspond to 1 hour or 45 minutes of participation to a congress or a course, or the completion of 1 eLearning module, etc. European countries adopt different rules to assign credits to every type of CME activity. In order to secure European exchange of quality CME credits for the medical specialists in Europe, the Union of Medical Specialists (UEMS) established the European Accreditation Council for Continuing Medical Education (EACCME) who declares that “a universal unit of CME credits is necessary. This is the *Hour of CME Credit*. When other units are being used, a fixed exchange rate is necessary” (EACCME Annual Report, 2002: 4).

In order to facilitate the exchange of credits among European countries, in January 2007 the European CME Credit (ECMEC) was established: “One ECMEC equals to one hour of CME (with a maximum of 6 hours for a full day and 3 hours for a half day activity)” (EACCME Annual Report, 2007: 1-2).

ECMEC can be used to exchange credits between European countries, between different specialties, in case of a specialist moving to a different country within Europe, and between the European credit system and comparable systems outside Europe.

According to the EACCME, CME should be voluntary but is highly advised. Several European countries however, differ from this opinion and have mandatory systems. The following options were identified:

- Mandatory by law CME: healthcare professionals are required by law to maintain their professional competence. In some of these countries, they may lose their license if they do not fulfill their CME duties.
- Semi mandatory CME: regulated by the profession, there is no re-licensing, but compliance with CME standards is necessary. In some countries, insurance companies refuse covering healthcare professionals who do not participate to CME.
- Voluntary CME: healthcare professionals are free to decide for themselves.

Accreditation of eLearning courses

eLearning raises problems among European countries regarding the accreditation of eLearning activities for healthcare professionals. The UEMS Advisory Council on CME recommends that “expert advice is necessary in the field of internet-based CME” (UEMS, 2001: 7) and asks the EACCME to “convene a group of individuals from the medical profession with both professional and technical expertise in the field of internet-based CME to report to the Management Council.” (EACCME, Annual Report, 2002: 2). The Swiss Medical Association (FMH) strongly advises to use and accredit online continuing education

courses which use self-assessment tools. At the moment, there is no general standard guide which defines the number of credits that have to be assigned for each eLearning course.

2.3.2 Electronic Continuing Medical Education

The research allowed collecting definitions given by three European Medical Associations who published their own definition of eLearning. The various definitions can be recapitulated as follows: *eLearning in CME is the employ of educational material which is partly or totally available in electronic means. New media like the internet, intranets or multimedia platforms like CD-ROMs and DVDs are used, which allow the participants to attend the modules from their home or office. Such digital applications allow the creation of interactive learning tools.*

The Austrian Medical Association (Österreichische Ärztekammer - ÖÄK) is the only countrywide medical organization in Europe that gives an official definition of eLearning. The official statement declares the following:

eLearning is a term that describes general teaching/learning material and training which is being provided and made possible partially or fully on electronic means. To do so, Internet, Intranet or simple multimedia platforms like CD-ROMs and DVDs are being used (Bachmann et al., 2006: 2).

In Italy, eLearning in CME is part of “Distance Education” (FAD - Formazione A Distanza) activities. The Italian Health Ministry defines the latter as the creation of educational events with the use of enduring materials such as: paper, audio, video, informatics, electronic and multimedia, which can be replicated endless times in different places and at different times (Linetti, 2006).

The French Medical Association (Union Nationale des Associations de Formation Médicale et d'Evaluation Continues - UNAFORMEC) developed three pedagogical methods that have been adapted to adult pedagogy in order to be used in the internet: case methodology (or index pedagogy); learning by questions; and learning by reading (or simple learning). These criteria define the characteristics of an eLearning activity. Finally, the Medical Association of Malta advertises eLearning to its members as a way of practicing CME from the comfort of one's home (Bachmann et al., 2006).

These definitions are close to the ones that have been given to eLearning in the literature, however, they also point out what tools or activities are welcome for the CME field. The following lines try to explain eLearning in CME by positioning it in the context of medical education.

The eCME diagram

The following diagram wants to illustrate how eLearning meets the medical field, generating eLearning in CME (from now on eCME). It wants to clarify where eCME is positioned among the contexts that surround it (eHealth, under/postgraduate education and CME).

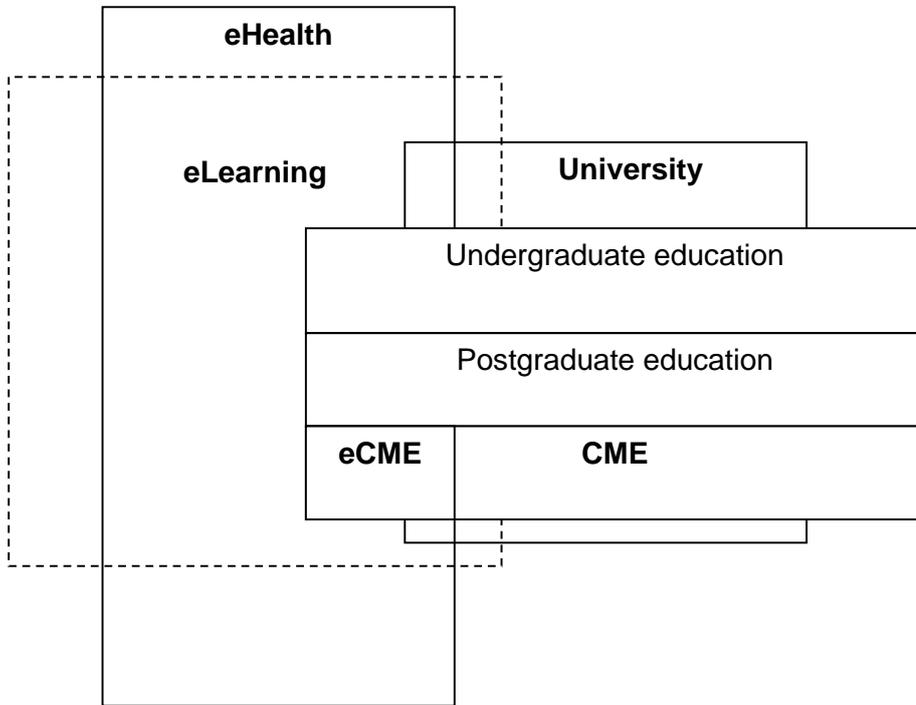


Figure 2.1: The eCME diagram

The left frame of the diagram (Figure 2.1) represents the eLearning field. One part of this field, among all the contexts it touches, intersects with the area of eHealth in which such activities as undergraduate, postgraduate and continuing medical education can take place in an online context (which explains the intersection with the eLearning box in the diagram); these events are often organized by universities or other educational institutions. ECME is created by the intersection of CME and eLearning where the latter meets eHealth. The following section wants to suggest possible reasons to adopt eCME.

2.3.3 What eLearning offers to Continuing Medical Education

This section illustrates several reasons why eLearning can be considered advantageous. Cantoni and Di Blas (2006) identify the following reasons that justify the use of eLearning in educational contexts (see also Bates, 2000; Cantoni and Esposito, 2004):

- *to improve teaching quality* (i.e. the opportunities multimedia supports offer to represent real objects like for example works of art);
- *to offer the students experience with the use of technologies*: in this case acquiring skills in informatics is an indirect consequence, but still of big value for the educational activity;
- *to increase accessibility and flexibility*: it is possible to gain access to people who else would not have access to education;
- *to react to the technological demand*: in this case, the reason is that everybody uses it, so one cannot stay behind (Surry and Farquhar, 1997; Cantoni and Di Blas, 2006);
- *to reduce costs*: in specific cases, it is an opportunity to lower costs;
- *to increase the effectiveness of investments*: in many cases the presence of a powerful informatics infrastructure encourages the managers in using its potentials also in educational fields.

Similarly, eLearning can offer advantages to CME. Continuing Medical Education is progressively more important for post graduates because of an increasing pace of world-wide information exchange. ELearning is a way to adapt towards the challenges of new global knowledge (ICETEL, 2003). As observed in Figure 2.1, eLearning pervades CME and eHealth creating learning opportunities like the participation to online courses, the use of digital media like CDs or DVDs, the possibility to make laboratory experiments through simulation software, peer to peer communication in discussion forums and the opportunity to use online resources (like Medline or Mesh) to find articles. These are possible tools for

the exchange and the divulgation of new information in the medical field, like for example the development of new medicines, new techniques and so on (Cantoni, 2007).

The main characteristics that can be detected in graduates who participate in continuing education events are: lack of time, necessity to apply the acquired knowledge immediately, obtain a high level of professional experience and competence (Le Boterf, 2003), voluntary participation to courses, high motivation, need to solve specific problems, capacities for self-directed studying, etc (ICETEL, 2003). ELearning can help graduates participating to CME events by:

- *Improving learning quality*: various experiments that need to be carried out in a laboratory can additionally be shown using simulations and can be repeated numerous times. Objects that can be presented only through expensive machinery can be viewed at any moment to a large number of people using a personal computer (i.e. using multimedia supports to represent real objects, like for example a 3D animation of a virus);
- *Offering experience with the use of technologies*: the use of technologies for educational activities may prepare the participants for certain situations like: using the internet to find information about a rare disease, or assisting an operation through videoconferencing systems. This also shows how eLearning strongly interacts with eHealth (see Figure 2.1).
- *Increasing the accessibility and the flexibility* offering the possibility to participate to CME events at any time of the day without needing to leave the job and without travel expenses (accessibility despite geographic and time restrictions); for example, “teleconferencing technologies facilitate real-time collaboration without travel time and related costs” (Suggs et al., 2002); in places that are not easily accessible eLearning gives the opportunity to collect the necessary credits to maintain the certification without the physician having to leave his job (Hänggeli, 2003).

- *Reacting to the technological demand:* the involvement with this kind of activity increases technological skills; the participants want to be up to date with the latest technologies in order to keep up with their peers.
- *Reducing costs:* also in this case, the possibility to repeat expensive experiments numerous times thanks to computer simulations can be of great advantage; additionally, eLearning requires no transportation costs. “Communication technologies [...] offer the promise of being cost effective by reducing long distance bills and travel time” (Suggs et al., 2002).
- *Increasing the effectiveness of investments:* the installation of new hardware and software might encourage learning managers in using the new technologies to propose CME activities.

Despite these positive aspects, the use of technologies in education does not imply an improvement in the learning activities (Russell, 2001), nor does it grant eLearning acceptance from the learners’ side. The following sections analyze the diffusion theories referring in particular (from section 2.5 on) to the diffusion and acceptance of eLearning.

2.4 Diffusion theories

This section describes the diffusion of technological innovations (2.4.1) and gives an overview on the diffusion theories (2.4.2). It introduces to the next section (2.5), which illustrates the diffusion and the acceptance of eLearning.

2.4.1 Diffusion of technological innovations

The adoption of a new technology by a society is a process that differs for every innovation in time and in the percentage of adopters (Figure 2.2). Even in case of obvious advantages

by accepting a new technology, its adoption is not granted and therefore can be destined to fail or its expansion may be limited to a small number of users (Grübler, 1998).

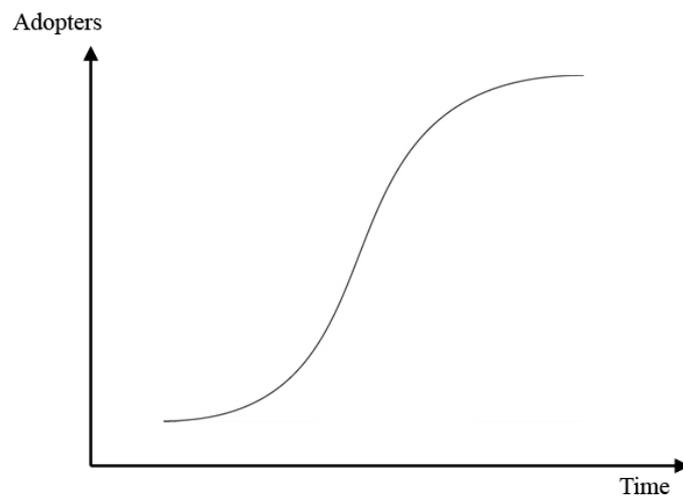


Figure 2.2: S-Curve representing the adoption of an innovation over time (Rogers, 2003: 344)

For example, an efficient technology that was not adopted is the Dvorak keyboard that did not manage to win its battle against the user unfriendly QWERTY. Most keyboards nowadays are using the QWERTY design, which was invented by Christopher Latham Sholes in 1873 with the intent of slowing down typists as they were often making typing mistakes by pressing two adjoining keys. He consciously put all most commonly used letters in uncomfortable positions in order to slow down the typing speed and avoid key jamming. When typewriters became mechanically more efficient and the two-finger hunt-and-peck system was replaced by touch typing, dissatisfaction with the QWERTY keyboard grew. Professor August Dvorak developed in 1932 a new keyboard (the Dvorak keyboard) which positions the letters more efficiently distributing the work load to the fingers according to their strength and skills. This innovation however, despite the obvious advantages, never

was adopted. The reasons for this failure lay in the interests of manufacturers, sales outlets, typing teachers, and typists themselves (Rogers, 2003) in sticking to the old design.

Two different approaches or attitudes towards technology acceptance can be identified: the *deterministic* view sees the adoption of new technologies as an inevitable event; according to this view, technologies develop by themselves, through necessary internal dynamics. Every new technology is more advanced than the previous one and for this reason it will necessarily be adopted. The deterministic approach can be divided into the *utopian* approach (technology will lead humanity to progress and salvation), and the *dystopian* approach (technology is harmful).

In the *instrumental* approach on the other hand, technological development is not unavoidable; the innovation dynamics meet social, cultural, economic, political and legal factors that determine the diffusion of a new technology (Cantoni, 2006; Winston, 1998). The instrumental approach is more suitable since, as already seen in the case of the Dvorak keyboard, not every new technology is adopted because it is more advanced or better than the previous one. According to Fidler (1997: 19) “inventions and innovations are not widely adopted on the merits of a technology alone”. The following point explains the uncertainties that occur when the moment arrives to decide whether or not to adopt an innovation.

Innovations and uncertainties

Choosing a new technology to adopt is a difficult process, one source of uncertainty is raised by the variety of solutions that are offered (Grübler, 1998); for example it might not be easy for a company to decide which operating system to install on its machines, or for a provider of online courses to choose among an open source versus a proprietary platform. Furthermore, when new technologies are invented they raise uncertainties which create anxiety to their potential adopters. Several uncertainties involve the *technology*. Questions arise on the reliability (Is it at least as reliable as the previous one?), the precision, and the

capacity (Are the results it gives at least as good?) of the new technology in comparison to the older one. Another important issue is the fear that a new technology will soon be replaced by an even newer one (potential obsolescence). *Financial* uncertainties can occur when questions arise about the revenues of the new technology (Will it pay off?); and finally *social* uncertainties may take place when the innovation causes changes in the society/organization's hierarchy (Mr. Doe, who has been working in company X for 20 years is an expert in using the old, complicated machinery. As soon as the new technology was installed, 22 years old Mike, who has been employed for barely 6 months, immediately understands how the new machine works and becomes the new person all the employees consult). The following section discusses diffusion theories further and analyzes their attributes.

2.4.2 Diffusion theories

Research on the diffusion of innovations started in the 1940s with the intent of examining the steps new ideas perform in order to be adopted by a society. From then on, a large number of researchers have questioned the reasons why different innovations have different adoption rates. The studies that aim at understanding diffusion factors are called *diffusion theories*.

According to Rogers (2003: 5) diffusion is “the process in which an *innovation* is *communicated* through certain *channels* over *time* among the members of a *social system*”. He adds that in order to overcome the previously mentioned uncertainties, several characteristics about the innovation must be identified which are called *perceived attributes* and explain different adoption rates:

1. *Relative advantage*: an innovation should be perceived better than the one it replaces, improving economical and social factors, being advantageous and satisfactory.

2. *Compatibility*: an innovation should be perceived consistent with the existing values, experiences and needs of the adopters.
3. *Complexity*: an innovation should be perceived as easy to understand and use.
4. *Trialability*: an innovation that can be tried out before its adoption has more probabilities to be accepted.
5. *Observability*: the results of an innovation should be observable.

Roger Filder (1997: 13-17) adds the following attributes:

6. *Reliability*: an innovation should be perceived as reliable.
7. *Familiarity*: an innovation should be perceived as similar to an existing one, like for example DVD disks must have been perceived as similar to video tapes and CDs.

The seven factors presented above underline the complexity of the acceptance process, raising questions about the process that leads potential adopters to decide whether or not to accept a new idea. The following point explains the steps in the innovation-decision process.

Innovation-decision process

The decision to adopt an innovation is not an immediate act but is a process that requires time, and consists of actions and decisions. Rogers (2003) defines the *innovation-decision process* as

the process through which an individual (or other decision-making unit) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision (Rogers, 2003: 168).

The stages identified by most diffusion researchers to describe the behavior that takes place in the innovation-decision process are the one represented in Figure 2.3. A description of the single stages follows.

I. The knowledge stage occurs when an individual (or other decision-making unit) learns about the existence of an innovation and understands how it functions. Exposure to new ideas depends on the individuals' interests, needs, and existing attitudes. According to Hassinger (1959, in Rogers, 2003) the exposure to messages about a new technology mainly happens if there is a need for innovation, and the exposure will have effects only if the innovation is perceived as consistent to the individual's needs, attitudes and beliefs. This process is called *selective perception*.

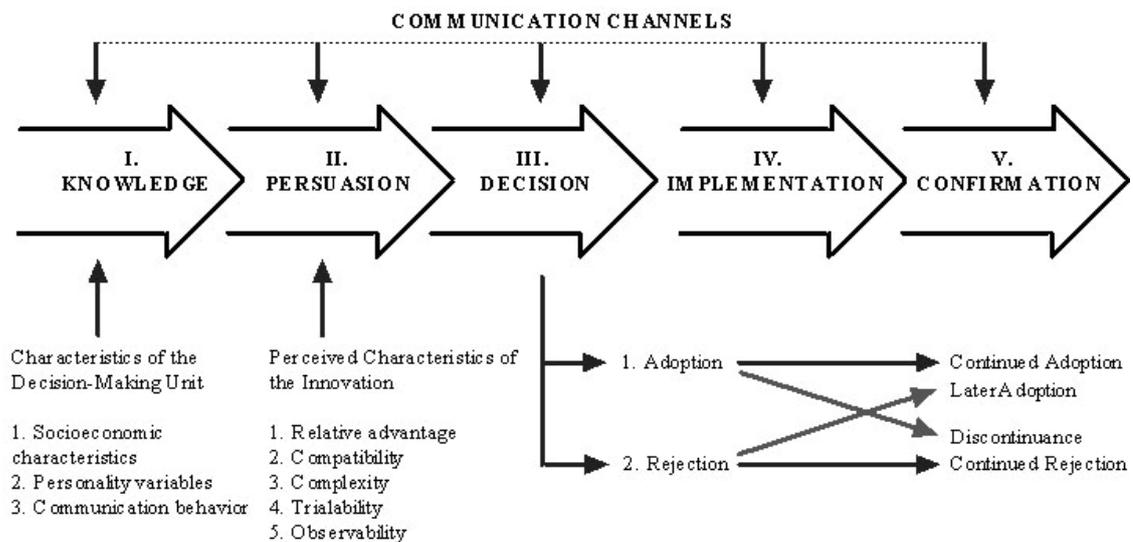


Figure 2.3: A Model of Five Stages in the Innovation-Decision Process (Rogers, 2003:170)

II. The persuasion stage occurs when an individual (or other decision-making unit) has developed a favorable or unfavorable attitude towards a new technology. At this stage, the individual seeks information about the innovation, decides what messages are credible and

how the information can be interpreted. The above mentioned perceived attributes (relative advantage, compatibility, complexity, etc.) are very important at this stage (see Figure 2.3). The subjective opinions of near peers (with personal experience in the adoption of the innovation) are the main source of information and the main cause for persuasion (Rogers, 2003). The positive attitude of a friend towards a new technology will positively influence the individual in the innovation-decision process.

III. The decision stage takes place when an individual (or other decision-making unit) gets involved in activities that lead him or her to choose whether or not to adopt an innovation. In this stage both the decision to make use of the innovation (*adoption*) or the decision not to adopt the innovation (*rejection*) can occur. Rejection can be *active* (when the adoption is being considered but the final decision is negative) or *passive* (when the adoption has never been considered).

IV. The implementation stage occurs when an individual (or other decision-making unit) starts using the new technology. In this stage there is a passage from a strictly mental process (stages I-III) to a behavior change when the new idea is put into practice. Until the moment the innovation becomes institutionalized as a regularized part of an adopter's ongoing operation a lengthy period of time may pass. At this stage *re-invention* can occur, when the innovation changes and evolves as it moves from adopter to adopter. Rogers (2003: 16) defines this process as "the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation".

V. Confirmation takes place when an individual searches for reinforcement of an innovation-decision already made, but might reverse the decision if exposed to conflicting messages. During the implementation stage the adopter can continue seeking information on the new technology and may decide to change his decision even after having decided to adopt it,

because of conflicting messages. The process in which an individual rejects an innovation after having previously adopted it is called discontinuance.

The overview on the diffusion theories presented in this section is needed as an introduction to the following section, which describes the diffusion of eLearning.

2.5 Diffusion and acceptance of eLearning

This section presents data on eLearning diffusion in the world (2.5.1), and illustrates the theoretical background of eLearning acceptance, based on a research made by Succi and Cantoni (2008) on “Corporate eLearning Acceptance” (2.5.2). This part together with the findings of the mentioned research (2.5.3) offer a solid foundation on which this research is based on. Section 2.5.4 studies eLearning acceptance in CME starting off from several parameters considered by Succi and Cantoni of great importance for corporate eLearning acceptance. Most parameters were also identified in the literature on eLearning activities organized in hospitals with the purpose to create a new list to be studied for the creation of an *eLearning Readiness Index* for hospitals.

2.5.1 ELearning diffusion

ELearning has rapidly expanded after the development of the World Wide Web. Since the first online teaching activity in the early 1980s, it has reached about 1 million courses in 2000 (Keegan, 2002). In the USA, statistics show that in 2002 over 1.6 million college students had participated to at least one online course and in China by 2003 almost 1.4 million university students had joined such types of activities (Bates, 2005).

In Europe eLearning is growing at high rates as well. The European Centre for the Development of Vocational Training (CEDEFOP) carried out an EU survey on the extent of eLearning in Europe, the targets were universities and colleges, private training companies

and public organizations. The results illustrate an increase of over 20% of eLearning courses from 1999 to 2001 (McCullough and Bainbridge, 2001). Other studies also revealed that Northern countries are adopting eLearning solutions at higher rates than the rest of the EU (Massy, 2004; Barron, 2000).

Also the diffusion of eLearning in CME shows high figures. In the USA, the Accreditation Council for Continuing Medical Education (ACCME) counted 79000 physicians who participated to internet education programs in 1999. One year later, more than double the participants were counted, reaching 182000 learners (Hall, 2002). According to MELD (MedBiquitous E-Learning Discourse) in 2004 over 230 websites offered eCME with over 19000 eLearning hours (Long, 2004). In the year 2000 a study conducted on the status of online Continuing Medical Education found 96 sites offering over 3000 credits. At the end of 2006, the same study revealed 300 sites containing about 16000 courses offering about 26000 credits (Sklar, 2006). Furthermore, from 1998 to 2003 the number of ACCME accredited eCME activities increased from 1035 to 8376 and the number of eCME hours increased from 3436 to 34535 (AACME in Honorio, 2005). Despite the huge impact of the sector, few data was found on the growth of eCME.

The large expansion of eLearning raises questions on its relations to the diffusion theories. The following sections study the acceptance process of eLearning activities.

2.5.2 ELearning acceptance

This section briefly explains the theoretical background of technology acceptance, the diffusion and mediamorphosis of eLearning and finally it describes the characteristics of eLearning adopters.

Throughout literature, acceptance is referred to in different terms: Rogers (2003) calls it *adoption* defining it as the decision to make full use of an innovation, and Davis (1989) calls it *use* defining it as the user's decision on how and when to use a technology. In order to introduce the research on corporate eLearning acceptance (Succi and Cantoni, 2008), the following sections define technology acceptance and illustrate several technology acceptance models; furthermore, eLearning diffusion, eLearning mediamorphosis and the characteristics of eLearning adopters are explained and, finally, the corporate eLearning acceptance model is presented.

Technology Acceptance

The acceptance or rejection of computers is one of the most challenging issues in information systems (IS) research (Swanson, 1988 in Davis, 1989). A large number of researchers studied user's attitudes and behaviors towards technologies. In general, however, the results of these researches were mixed and inconclusive (Davis, 1989). The determinants of user behavior can be identified by studying intention models from social psychology. The *theory of reasoned action* (TRA) of Fishbein and Ajzen (1975) has proven to be a successful intention model to predict and explain behavior across a wide variety of domains. It is a very general model which has been designed in order to explain virtually any human behavior (Ajzen and Fishbein, 1980 in Davis, 1989). Davis (1989) adapted TRA to explain computer usage behavior, developing a model that specifies computer acceptance called *technology acceptance model* (TAM). The following lines illustrate TRA, TAM and the *Unified Theory of Acceptance and Use of Technology* (UTAUT) model which combines several technology acceptance theories.

Theory of Reasoned Action (TRA)

This general model of user actions studies the determinants of consciously intended behaviors (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975 in Davis, 1989). It explains

the following factors which determine a specific behavior: behavioral intention (BI), attitude (A) and subjective norm (SN). Behavioral intention corresponds to the intention to perform a certain behavior, which is determined by the attitude and the subjective norm ($BI = A + SN$). More specifically, as represented in Figure 2.4, BI measures the strength of an intention to perform a behavior, A represents positive or negative feelings a person has towards performing a behavior and finally, SN corresponds to the perception an individual has of what the people who are important to him think about performing or not a certain behavior (Fishbein and Ajzen, 1975 in Davis, 1989).

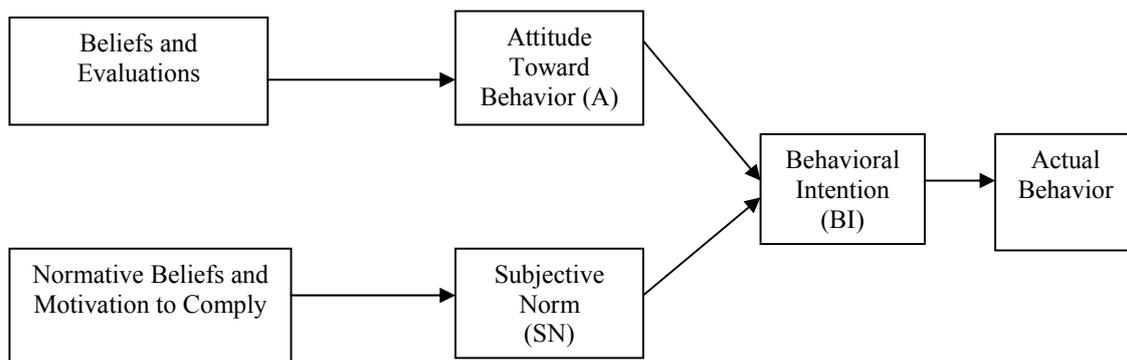


Figure 2.4: Theory of Reasoned Action (Davis et al., 1989: 984)

Technology Acceptance Model (TAM)

As previously mentioned, this model was introduced by Davis (1986), who adapted TRA to predict technology acceptance. According to TAM, two factors influence computer acceptance behaviors: *perceived usefulness (U)* and *perceived ease of use (EOF)* (Figure 2.5). Perceived usefulness is defined as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context” (Davis et al., 1989: 983). Perceived ease of use is defined as “the degree to which the prospective user expects the target system to be free of effort” (Davis et al., 1989: 985). According to TAM, computer usage is determined by behavioral intention

(BI), where the latter is defined as the attitude (A) and the perceived usefulness (U): $BI = A + U$, where the attitude (A) is determined by perceived usefulness and ease of use ($A = U + EOU$). Results from researches conducted by Davis et al. (1989) demonstrate that:

- Computer use can be predicted reasonably well from people's intentions.
- Perceived U is a major determinant of people's intention to use computers.
- Perceived EOU is an important secondary determinant of people's intentions to use computers.

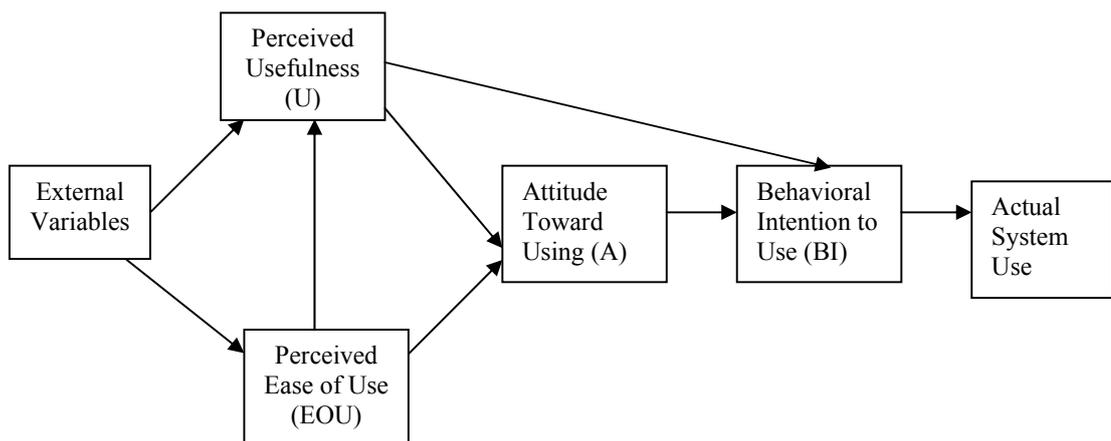


Figure 2.5: Technology Acceptance Model (Davis et al., 1989: 985)

Both TRA and TAM suppose that a person with an intention to act is free of limitations, while in reality many constraints can limit freedom like lack of ability, time restrictions, environmental limits, organizational limits, and habits (Bagozzi et al., 1992).

The Unified Theory of Acceptance and Use of Technology (UTAUT)

In order to integrate the 8 main competing user acceptance models (TRA, TAM, motivational model, theory of planned behavior, a combined theory of planned behavior/technology acceptance model, model of PC utilization, innovation diffusion theory,

and social cognitive theory), Venkatesh et al. (2003) implemented the *Unified Theory of Acceptance and Use of Technology (UTAUT)*. This theory aims at explaining user intentions to use an information system and subsequent usage behavior. Three determinants of intention to use were established: performance expectancy, effort expectancy, and social influence. Furthermore, two direct determinants of usage behavior were established: intention and facilitating conditions. Gender, age, experience and voluntary use are assumed to mediate the impact of the determinants on usage intention and behavior. According to research results it outperformed each of the individual models (Venkatesh et al., 2003).

Technology acceptance model and eLearning

The continuous growth of the eLearning market has created a lot of interest in the topic of user's acceptance of online learning applications (Liu et al., 2005). TAM has been proven to be an effective tool to predict user acceptance of eLearning environments and to evaluate its educational products (Gao, 2004; Cantoni et al., 2007). Its aspects are important for the explanation of the MeLA model (described in section 2.5.3), and for the further development of the research. At first, however, more specific attributes about the evolution and the diffusion of eLearning and characteristics about its adopters must be studied. The following points illustrate these aspects.

Diffusion and mediamorphosis of eLearning

Nowadays technological change may seem to happen more rapidly than in the past; however, research on historical documents proves that this is a common misunderstanding. Paul Saffo (1992) states that the amount of time new ideas require to be completely adopted in a society averagely lasts 30 years. He identified three stages of a technology's development:

- 1) First decade: lots of excitement and confusion, limited penetration
- 2) Second decade: lots of variation, the penetration of the product into society starts.

3) Third decade: everybody has the technology.

Also eLearning followed this rule: as already seen in the previous sections, the first activities took place in the 80s, its penetration in schools and universities took place during the 90s, and during the first decade of the new millennium it is widely available in a big variety of environments (e.g. companies, institutions, organizations, etc). This new means of communicating educational content was developed in a context where distance education was becoming more and more common and important (see section 2.2.1 development of open universities). Needs rose to handle a larger number of distance learning students and an evolution of the existing technologies was needed. This transformation is called mediamorphosis, which Fidler (1997: 22-23) defines as “the transformation of communication media, usually brought about by the complex interplay of perceived needs, competitive and political pressures, and social and technological innovations”.

Like section 2.4.1 (Diffusion theories) already pointed out, an innovation has familiarities with the older technology, and does not totally substitute or eliminate it, therefore, according to Cantoni et al. (2007), eLearning is not an educational revolution, but an evolution in the ICT context; he applies to it the six principles of mediamorphosis (Fidler, 1997: 29):

1. *Co-evolution and coexistence*: “All forms of communication media coexist and co-evolve within an expanding, complex adaptive system. As each new form emerges and develops, it influences, over time and to varying degrees, the development of every other existing form”. The same way various educational forms coexist and develop together (with or without the use of ICTs).
2. *Metamorphosis*: “New media do not arise spontaneously and independently – they emerge gradually from the metamorphosis of older media. When newer forms emerge, the older forms tend to adapt and continue to evolve rather than die”. ELearning is being developed according to previous educational traditions.

3. *Propagation*: “Emerging forms of communication media propagate dominant traits from earlier forms. These traits are passed on and spread through communicatory codes called languages”. ELearning extends traits of previous educational traditions.
4. *Survival*: “All forms of communication media, as well as media enterprises, are compelled to adapt and evolve for survival in a changing environment. Their only other option is to die”. Educational activities which did not make use of ICTs tend to evolve and adapt to survive in a changing context.
5. *Opportunity and need*. “New media are not widely adopted on the merits of a technology alone. There must always be an opportunity, as well as a motivating social, political, and/or economic reason for a new media technology to be developed”. ELearning is developing in the social and economical context of the knowledge society, helping by answering to new needs.
6. *Delayed adoption*: “New media technologies always take longer than expected to become commercial successes. They tend to require at least one human generation (20-30 years) to progress from proof of concept to widespread adoption”. The diffusion and the complete integration of eLearning require time, which usually corresponds to one generation.

The behavior of adopters is of great interest to better understand this type of process. The following section separates the adopters in five categories and relates them to Roger’s diffusion curve.

ELearning adopters

Diffusion theories describe five different types of adopters, which can be represented in a bell-shaped curve (see Figure 2.6). They are categorized as:

- 1) *Innovators*, who represent about 2.5% of the population. They are venturesome and their interest in new ideas leads them to a positive attitude towards innovations. They will adopt the new technology because it is “new” and they can afford it. They convince the opinion leaders of their company, institution or community to adopt a new technology explaining its characteristics and making demonstrations.
- 2) *Early adopters*, who represent about 13.5% of the population. They have a high degree of opinion leadership and convince the persons related to their interpersonal network to adopt the new idea as well. Rogers (2003) comments that the early adopters push the diffusion of a new technology.
- 3) *Early majority*, who represent about 34% of the population. They adopt new ideas just before the average member of a system; their motto is “Be not the first by which the new is tried, nor the last to lay the old aside” (Rogers, 2003: 284).
- 4) *Late majority*, who represent 34% of the population. They are skeptical people who will use the new technology once the majority accepted it.
- 5) *Laggards*, who represent 16% of the population. They are traditional and are critical towards new ideas. They adopt the new technology when everybody else has already done so, risking making use of it when it is already too old and the new one is available on the market.

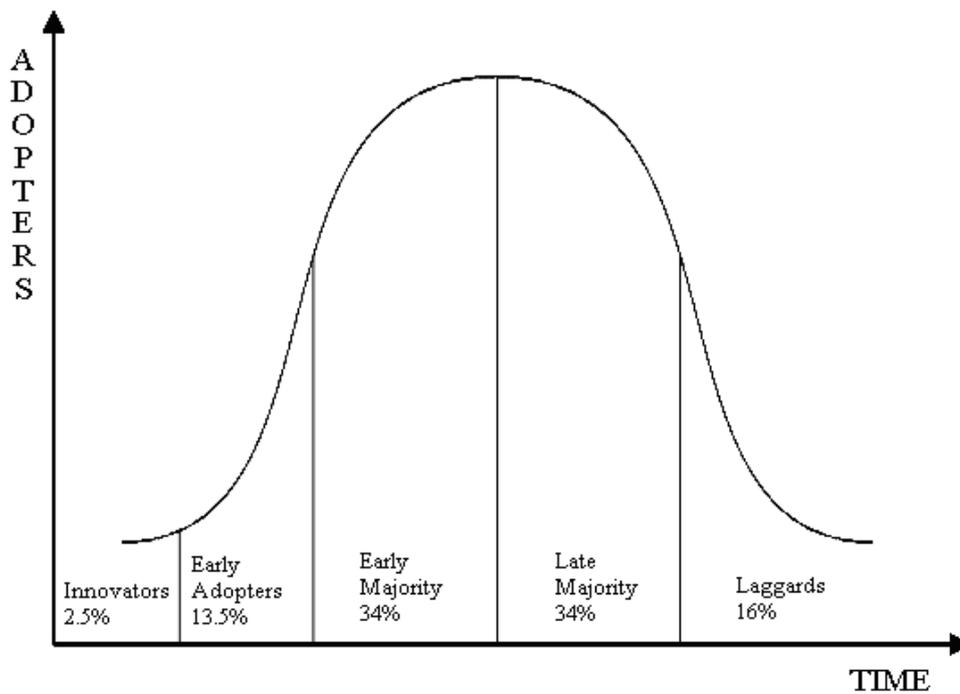


Figure 2.6: Adopter Categorization on the Basis of Innovativeness (Rogers, 2003: 281)

Rogers demonstrated that the diffusion curves of new technologies are S-shaped (Figure 2.7). It is possible to notice that the adoption accelerates when its diffusion reaches 10-25% of its market, and the early adopters are the necessary catalyst to reach the take off point.

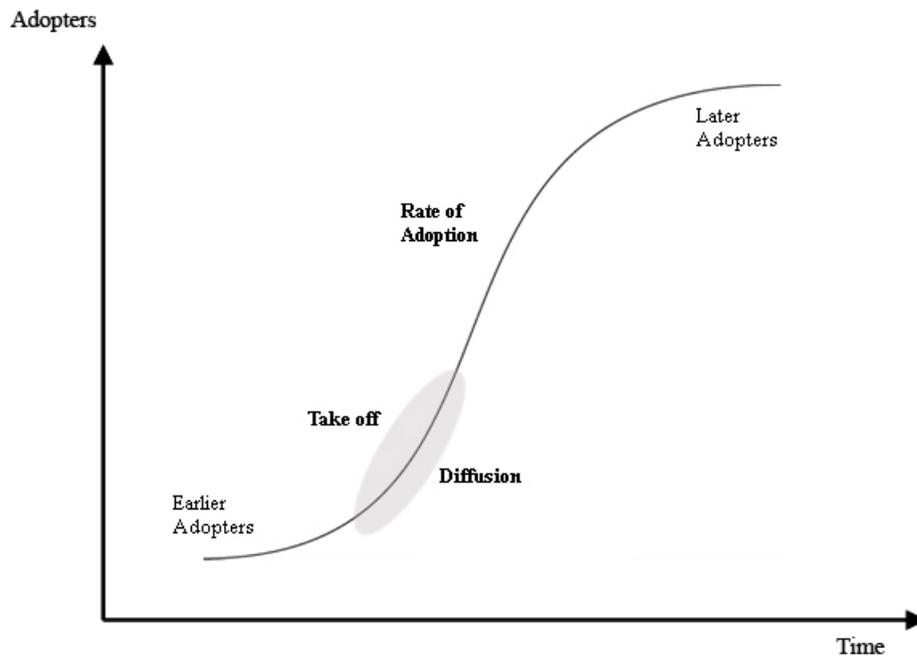


Figure 2.7: Adoption curve and diffusion (Fidler, 1997: 15)

A diffusion curve allows comparing the degree of acceptance in individuals with other members of a system, usually measured as the number of members in the system to adopt the innovation in a given time period. According to Rogers (2003), the adoption process of a new technology is a consequence of an exchange of information among interpersonal networks. First adopters discuss the new idea with the members of their system and the new adopters spread the idea to other peers. The diffusion curve starts stabilizing when at least half of the individuals of a certain society have adopted the innovation; this happens because it becomes progressively more difficult to find peers who have not yet adopted the new technology. The “critical mass” represents the transition from “early adopter” to “early majority” and takes place between 10 and 20 percent of the adoption process.

Student dropout

Diffusion theories do not explain the widely spread phenomenon of students who abandon courses; in particular, large numbers of dropouts are measured in eLearning activities (Meister, 2002; Wang et al., 2003). Frequently, employees do not start eLearning activities even when they are obliged to (Jun, 2005), and dropout rates of 10% to 20% higher than in face-to-face events are identified by eLearning managers (Frankola, 2001).

Student *dropout* was widely studied in the past 50 years in the fields of higher education and distance education, in order to understand the reasons for course acceptance or dropout. The decision process that takes place is very complex and depends on many variables such as the educational program, student characteristics and elements of the context (Cantoni et al., 2007).

Corporate University Xchange (an education and research consulting firm) studied the expectations of corporate eLearners about the courses offered by their companies. The most important identified wishes were: credential as an outcome (college credit or a certificate); active online discussions with a facilitator with frequent online presence; 24/7 technical support; and the possibility to start a course anytime (Frankola, 2001). The participants declared that the main reason for dropping out was lack of time. In many cases the unsuitable environment (frequent distractions from coworkers) and the impossibility of accessing to the course outside the company were reasons for dropouts. Other inhibiting factors were: lack of management oversight; lack of motivation; problems with technology; lack of student support; individual learning preferences; poorly designed courses; substandard/inexperienced instructors.

According to a study conducted by the James Madison University in collaboration with the MASIE center (Wang et al., 2003) the most important factors that contribute to eLearning completion are: personal motivation, interesting learning interactions, mandatory company

completion policies, and online instructors/facilitators' follow-up. On the other hand, the main factors influencing dropout rate were the following: lack of motivation, instructional design-related factors and learning style mismatch, time conflicts with work and family commitments, learning what one needed to know and being able to do the job before the end of the course, and lack of organizational support.

These important factors determining eLearning dropout were identified in the literature and reported in Table 2.2 (eLearning Readiness Index, Succi and Cantoni, 2008, section 2.5.4). Examples are presented from studies and projects in eLearning in CME. Also dropout in eCME is very frequent, according to Hall (2002) in the USA the Accreditation Council for Continuing Medical Education counted high dropout rates in eCME courses. According to Long (2004) dropout rates for eLearning in CME sometimes reach 70%.

The study on eLearning dropout and acceptance in eCME activities proposed in hospitals (Chapters 4 and 5) is based on the corporate eLearning acceptance model of Succi and Cantoni (2008), which proposes a list of the enabling factors affecting eLearning acceptance. The following sections present an eLearning acceptance map (2.5.3) proposed by the authors and the eLearning acceptance enabling factors mentioned earlier (2.5.4 eLearning Readiness Index).

2.5.3 ELearning acceptance map (MeLA)

The eLearning map proposed by Succi and Cantoni (2008) aims at understanding the phenomenon of eLearning acceptance and abandonment. It is based on acceptance research in the previously analyzed areas (see Figure 2.8):

Innovation acceptance: Diffusion Theories applied to the eLearning context.

Technology acceptance: Technology Acceptance Model extended to eLearning.

Learner acceptance: studies on learners' choice of carrying out or dropping out from a distance / eLearning activity.

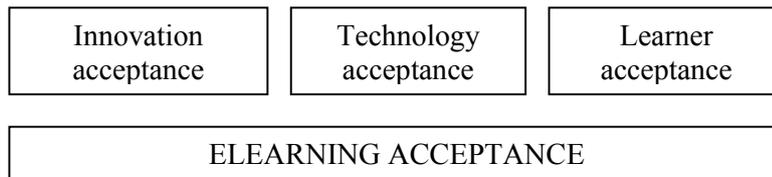


Figure 2.8: Different approaches to the eLearning acceptance issue (Succi and Cantoni, 2008: 40)

The main phases of the acceptance process are summarized in the eLearning acceptance map (MeLA - Figure 2.9). It is composed of three levels which indicate the *components*, the *phases* of the eLearning acceptance process and the *variables*. The following sections describe the various stages.

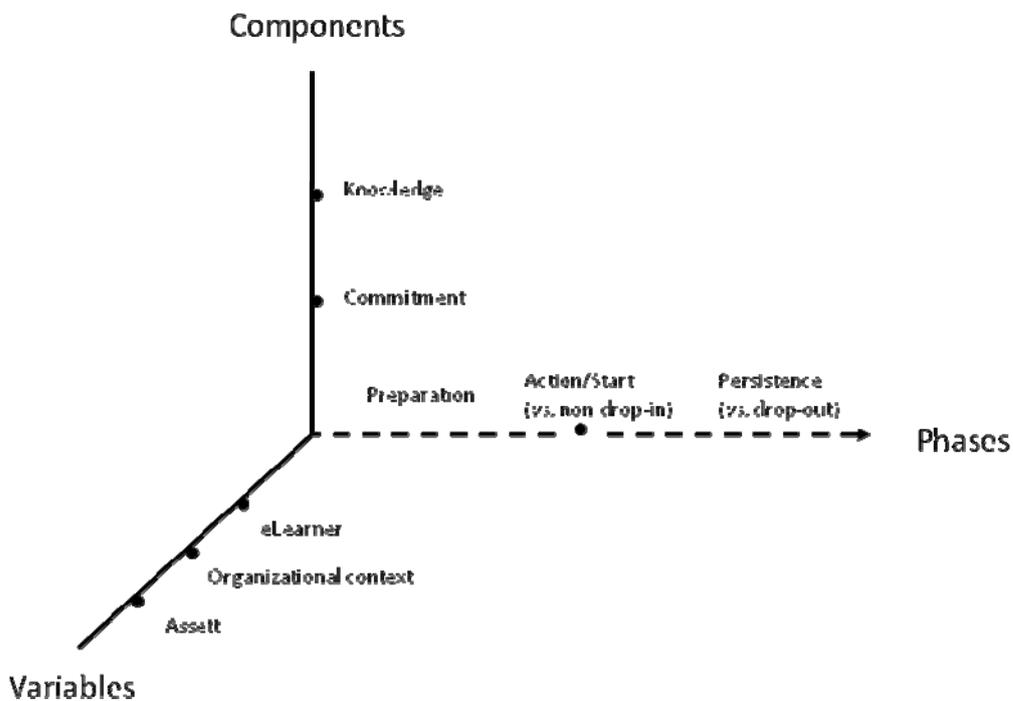


Figure 2.9: The Map of eLearning Acceptance (Succi and Cantoni, 2008: 42)

Phases of the process

The following sections explain the phases, which occur for an eLearning activity to be accepted: preparation, action/start and persistence. According to Succi and Cantoni (2008) the acceptance of an eLearning activity occurs when the eLearner is prepared, starts and carries on the activity.

Preparation

eLearners are invited to participate to an eLearning activity and receive information about it. The preparation phase wants to promote an activity by motivating the learners and by explaining them the details, methods and goals of the course. The eLearners have the possibility to discuss about the activity with their peers and they start building their expectations.

Action/Start

During this phase the eLearners start their activity and doing so they accept the learning contract. They collect first experiences and calibrate their expectations. During the first meeting (which can take place online or offline), all the tools and characteristics of the environment are explained, possible technical problems are discussed and assistance is offered.

Persistence

Persistence depends on how the eLearners judge their experience, balancing throughout the whole course the costs and the benefits it offers. Dropout can be caused 1) by a dissatisfaction of the learner's expectations: when the learner already knows the contents that are being offered, when the implications about the delivery method have been misunderstood, or when the available resource raises too many problems (too complex technological tools and bad relationships with teachers or peers); or 2) by a change of the eLearner's personal goals during the process (loss of motivation or misjudgment of the

learning experience which as time passes can be perceived as uninteresting, difficult or useless).

Relevant variables

MeLA defines three categories of variables, which correspond to critical factors that may determine the success of an eLearning activity: organizational context variables, eLearner variables and asset variables (Succi and Cantoni, 2008).

- *ELearner*: a large number of studies have been made to identify learner characteristics, usually they are referred as: *personal characteristics* (social and economic context, educational background), *skills* (competences that can be increased), and *attitude* (learning styles).
- *Organizational context*: the context of an organization can influence eLearning acceptance. Important factors that have been considered are: the type of support provided to eLearners, the relevance of the activity for the job, physical conditions, internal sponsoring, involvement and motivation.
- *Asset*: the asset variables of an eLearning activity determine the way its contents will be delivered. Factors like the quality of the content, the method and the proper combination of different methods (blended learning) are studied by instructional designers. From a technological point of view, the tools must comply with criteria which can affect acceptance (usability, velocity, reliability, etc.).

Main components

Knowledge and *commitment* are two fundamental components that occur in learning acceptance.

Knowledge

This component corresponds to the information eLearners receive before the eLearning activity starts (during the preparation phase). It increases during later phases (action and persistence) while the course is running. The acquired knowledge helps the participants to create opinions and expectations about the educational activity, especially about the course content (what it is about), the method (how it will work) and the resource (what tools/types of interaction are involved). Zenk et al. (2008: 284-285) identified seven factors supporting the application of eLearning in organizations: ELO (eLearning orientation): “availability of the required infrastructure and sufficient level of IT skills among employees”; WL (workload): “management must ensure that participation in training activities does not have significant negative consequences for employees, such as substantially increased time pressure”; OLO (organizational learning orientation): the organization encourages “its employees to make use of their newly acquired knowledge”; PPT (problems with prior work-based training courses) and WOT (work orientation of training courses): PPT and WOT “provide information on the suitability of online training”; FLO (face-to-face learning orientation): “employees are prepared for eLearning”; and EMT (extrinsic motivation for training): “extent to which an organization values the training efforts of its employees”.

Commitment

Commitment takes place during the preparation phase when eLearners collect first opinions about the activity; it starts as soon as enough information is gathered, and continues throughout the whole process. Student commitment can take place when there is a goal (didactic goal: a need to learn about something new), a motivation (compulsory systems,

incentives or certificates) and/or an experience (dependant on the social network, peer opinion, interest in the subject).

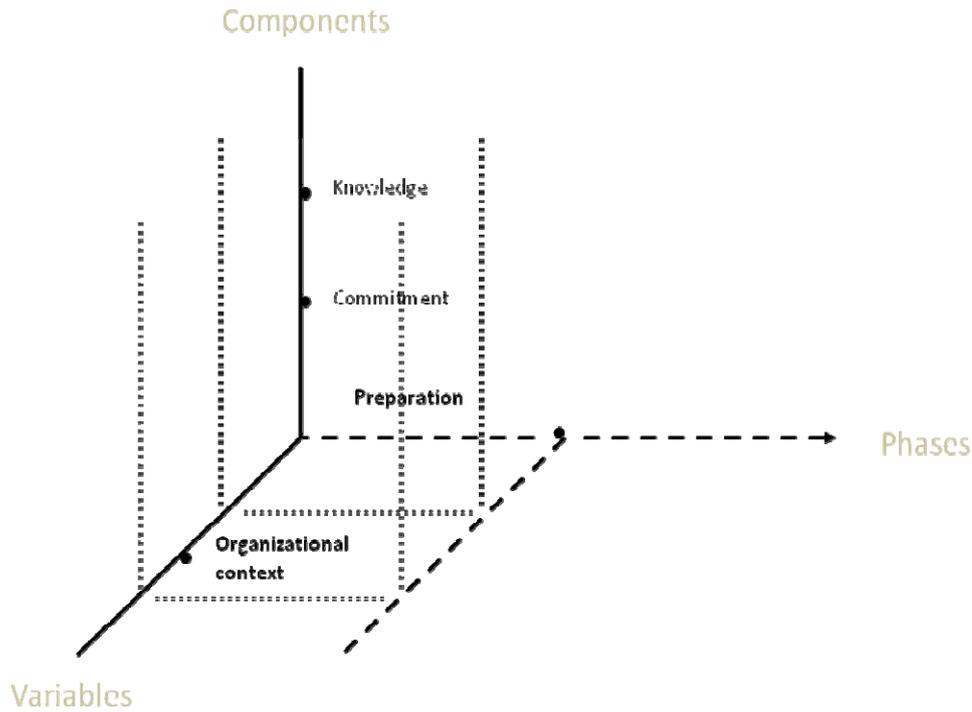


Figure 2.10: Scope area of the research to build an eLearning Readiness Index (Succi and Cantoni, 2008: 42)

In order to further study corporate eLearning acceptance in the hospitals' context, the study focuses on the same research area Succi and Cantoni (2008) have chosen. The actions that take place during the preparation phase, in the organizational context variable. It deals with knowledge and commitment components (Figure 2.10).

2.5.4 ELearning Readiness Index

Corporate acceptance of eLearning has been thoroughly studied by Succi and Cantoni (2008) who propose a Corporate eLearning Readiness Index (CeLeRI) based on data

retrieved from organizations. Starting from a first list with 42 factors enabling acceptance (see Appendix A.12), throughout surveys and interviews the study merged several parameters finally revealing the following 17 enabling factors affecting eLearning acceptance and their consequent entailed actions to achieve acceptance (Table 2.2):

Table 2.2: CeLeRI (Succi and Cantoni, 2008: 45)

#	Enabling factor	Entailed actions
1.	Perceived Usefulness	to build a connection between the eLearning activity and the learner's job
2.	Corporate Motivation	to enlist managers in supporting and involving in eLearning activities
3.	Support	to provide technical and content support during the eLearning activity
4.	Goal Commitment	to specify the behavioral/performance goals of the eLearning activity
5.	Preparation	to specify details of the eLearning activity (start date, due date, content, objectives, outputs, requirements, assignments, evaluation procedures, etc.)
6.	Institutional Commitment	to specify the organization's business goals for the eLearning activity
7.	Culture	to align eLearning activities with other training activities and with the organization's values, processes and practices
8.	Communication Behaviour	to use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)
9.	Voluntariness	to specify a target audience and/or the degree to which the activity is compulsory or voluntary
10.	Time	to set specific time restrictions/deadlines for the eLearning activity
11.	Peer Communication	to place "champions" in the different locations to support activities
12.	Training	to prepare/train eLearners about relevant issues and skills in order to attend successfully an eLearning experience (i.e. time management, self-directed learning, etc.)
13.	Perceived Relative Advantage	to clarify the advantage(s) of eLearning (as compared with other training solutions)
14.	Incentives	to create incentives and/or a recognition system for eLearning results
15.	Experience and Expectations	to track eLearners' expectations and/or their previous experiences with eLearning

#	Enabling factor	Entailed actions
16.	Perceived Observability	to provide eLearners with the opportunity to try technologies/tools before actually starting the eLearning activity
17.	Place	to set guidelines for the physical environment where eLearning takes place (e.g., space, noise, interruptions, etc.)

CeLeRI aims at helping eLearning managers to make choices on organizing and promoting eLearning activities and at improving eLearners' satisfaction. These parameters are used in the research in order to clarify if they are applicable in the Continuing Medical Education field.

The following Chapter presents the research methodology, illustrating the various phases of the data collection that lead to the creation of an eLearning Readiness Index for the Continuing Education of healthcare professionals.

Chapter 3 - Methodology

3.1 Introduction

The main purpose of the research is to study eLearning acceptance among healthcare professionals in hospitals and compare the findings to eLearning acceptance in the corporate sector (CeLeRI, Succi and Cantoni, 2008). A comparison between the two studies is done and new parameters relating to the medical field are revealed. The second objective is to create an eLearning Readiness Index for continuing education managers devoted to the organization of educational activities for healthcare professional who work in hospitals.

The research combines quantitative and qualitative data which has been collected through several interviews and surveys. The following sections explain how the data collection was carried out and the various phases of the research.

3.2 Data collection

This section explains the methods by which the data were obtained. As already mentioned above, the research combines quantitative and qualitative data, which has been collected in three phases: a *pre-phase* during which a questionnaire was sent to European Medical Associations and Health Ministries, a *pilot phase* during which a questionnaire was reviewed thanks to four interviews (the number of interviews was enough to cover the issues because a lot of information was collected during the pre-phase and the questions had to be similar to the ones used for corporate sector), and a *main phase* during which a test questionnaire was sent to a sample of 200 hospitals to obtain a first overview on the responses and to make a few last revisions to the final version, which was sent to 3006 hospitals in Europe and in the United States, and to the mailing list of the French medical association (9200 addresses).

3.2.1 Pre-phase

This section explains the first phase of the research during which the European CME systems have been thoroughly studied. The first purpose of this phase was to retrieve information on the diffusion of eLearning in this field in the European context, the second purpose was to understand the procedures involved in the continuing education process of medical professionals. These steps were necessary in order to set the basis for the survey of the main phase.

Research on regulations

An internet search was carried out in order to find and study the CME regulations of every country member of the UEMS (European Union of Medical Specialists). The members are represented by Medical Associations or Health Ministries of countries in the European Union (EU) and in the European Free Trade Association (EFTA); in total 27 countries were studied (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Sweden, Switzerland, United Kingdom). Relevant keywords were searched in search engines (Google, Yahoo!) to find the website of the Medical Association or Health Ministry of every country; the URLs of several sites were available on the website of the UEMS.

Medical Associations and Health Ministries

Research of the regulations in various libraries and health associations was proven to be unfruitful. All the countries that did not provide the necessary information on their website (22 out of 27) were contacted by mail, fax or email; those who did not answer were contacted by phone. The associations or ministries were asked to send the CME regulations of their country (when available), and if they were available to answer a questionnaire.

Questionnaire

A questionnaire was prepared, followed by discussions with several field experts to improve it and recognize its value. The final version of the questionnaire (see Appendix A.1) was published online and on printed media, and as already explained above was sent by email, mail or fax to all Medical Associations and Health Ministries because no National Accreditor provided enough information neither in the website nor in the regulations. Several questionnaires were sent with a reduced number of questions when the latter were answered by the already available information. The respondents clearly were asked to report the official rules of their institution, not their opinions. About 40% of the respondents were contacted by phone to motivate participation, and in a few cases unclear questions were explained during the phonecalls.

This procedure allowed collecting the information needed to study the acceptance, the benefits and the contributions of eLearning activities in European Continuing Medical Education. The analyzed criteria of the questionnaire were the following:

1. The aims of the Medical Association / of the Health Ministry
2. The country's CME system (national vs. regional)
3. Number of credits/points to be collected in a certain amount of time
4. What one credit/point corresponds to
5. Minimum/maximum number of credits required
6. Automatic recognition of EACCME credits
7. Official statement about the importance of CME
8. Number of health professionals members of the medical association
9. Mandatory vs. voluntary CME system:
 - mandatory by law (required by law to maintain the professional competence)
 - semi mandatory (regulated by the profession)
 - voluntary (the physician can decide)
10. Number of health professionals taking part to CME activities

11. Consequences for a member who does not participate to CME activities
12. Benefits for a member who participates to CME activities
13. Types of eligible eLearning activities
14. Providers of online activities
15. Rules to add an eLearning activity to the list of official CME activities
16. Common expression used for eLearning
17. Official definition of eLearning
18. Contribution of eLearning to CME
19. Positive/negative aspects revealed from eLearning activities

Interviews

A first interview was made with the director of the CME department of the Italian Health Ministry in order to retrieve the missing data from the Italian medical system. The interviews were based on the questions of the pre-phase questionnaire, which were shown to the respondents and read aloud or explained when necessary. Due to the delay in receiving answers from several countries, a second interview was made with the director of the European Training Centre for Social Affairs and Public Health Care (CEFASS) an antenna of the EIPA (European Institute of Public Administration), in order to find further people available to answer the questionnaire. Thanks to this meeting several new contacts were found and contacted. A third interview has been conducted with the director of CME development at the French Medical Association (UNAFORMEC), to retrieve the missing information about France.

3.2.2 Pilot phase and interviews description

Following the pre-phase a pilot phase was carried out. During this phase a second questionnaire was created with the intention of achieving the research purposes described in section 3.1. The function of this phase was to identify problems in the questionnaire and

collect opinions, ideas and criticisms. The target populations of the study were CME managers working in hospitals, continuing education experts, statistics and marketing experts. The purpose of the pilot phase was to test the questionnaire and modify it according to the needs of CME managers. Additional information is available in the following sections.

Questionnaire

The prototype of the questionnaire (Table 3.2) was based on the survey created by Succi (2007) (Table 3.1) and on the data retrieved during the pre-phase and the literature review. The differences among the two questionnaires are explained in the following sections.

Table 3.1: eLearning Readiness Index Questionnaire (Succi, 2007) (Appendix A.2)

<p>PART I</p> <p>1. Each organization does different activities to prepare learners before launching/releasing an eLearning activity. Please, indicate if these activities are done by your organization (YES or NO)</p> <p>2. Please, indicate now your own opinion about the IMPORTANCE of the following activities (1 = not at all; 2 = slightly; 3 = moderately; 4 = quite important; 5 = extremely important). <i>(The 17 actions were listed below this question to answer questions 1 and 2).</i></p> <p>3. Please indicate if the relative communicative actions are done or not by your organization (YES or NO). <i>(The 17 actions were listed below this question to answer questions 1 and 2).</i></p> <p>PART II</p> <p>4. In which sector does your organization operate?</p> <p>5. How many employees work in the organization?</p> <p>6. When did your organization start offering eLearning activities?</p> <p>7. Which is your role in the organization?</p>

- | |
|--|
| <p>8. Could you, please, indicate your name?</p> <p>9. Could you, please, indicate your email address?</p> |
|--|

Succi's questionnaire (Table 3.1) was divided into two parts: part I contained questions about the actions that can be performed to inform the employees about the available eLearning activities (importance of the actions, occurrence of the actions and communication of the actions), and part II contained general questions about eLearning, the organization and information about the respondent.

In the questionnaire of the pilot phase the same structure was maintained. Questions one and two were utilized (Table 3.2): they aimed at determining which actions are present in the eLearning process in the hospitals and their importance according to the experience of the CME managers. The revised eLearning Readiness Index with the 22 actions explained in section 4.3 was listed to answer questions one and two. The parameters were inserted in Chapter 4 as part of the results, after having identified them thanks to a detailed literature review.

The third question of the eLearning Readiness Index questionnaire (see Appendix A.2, Succi, 2007), where the 17 original parameters were translated into communicative actions, was not kept due to the confusion this section created during Succi's survey with the first two questions and in order to reduce the length of the questionnaire.

Furthermore, it appeared necessary to add a question on the type of activity offered by the hospitals in order to better understand what kind of online event healthcare professionals participate to. The possible answers, a list of eLearning activities, were selected during the pre-phase: online courses; CDs, DVDs or other digital media; participation to videoconferences; participation to discussion forums; reading articles in the internet; reading emails about relevant material; other.

Question 4 of the eLearning Readiness Index Questionnaire (In which sector does your organization operate?) was not kept because the sector was already identified. The remaining questions were not modified for this phase. The questionnaire of the pilot phase is available in Table 3.2:

Table 3.2: Pilot phase questionnaire (see full version in Appendix A.3)

<p>PART I</p> <p>1. Please select the activities your hospital performs before starting an eLearning activity (select the correspondent checkbox next to each activity).</p> <p>2. Please indicate your opinion on the importance of the following activities (1 = not at all important; 2 = slightly important; 3 = moderately important; 4 = quite important; 5 = particularly important)</p> <p>List of Actions:</p> <p><i>ACTION 1: Underline the relevance between the eLearning activity and the learner's specialty or activity in the job.</i></p> <p><i>ACTION 2: Encourage managers in supporting and getting involved in eLearning activities.</i></p> <p><i>ACTION 3: Provide technical and content support during the eLearning activity.</i></p> <p><i>ACTION 4: Specify the expected changes in the professional practice.</i></p> <p><i>ACTION 5: Specify the details of the eLearning activity (starting/due date, contents, objectives, requirements, assignments, evaluation procedures, etc.).</i></p> <p><i>ACTION 6: Set specific time restrictions/deadlines for the eLearning activity.</i></p> <p><i>ACTION 7: Specify the goals the hospital wants to achieve by proposing the eLearning activity.</i></p> <p><i>ACTION 8: Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices.</i></p> <p><i>ACTION 9: Use communication/internal marketing channels to promote the eLearning</i></p>
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activity (direct communication, intranet, posters, newsletters, etc.).

ACTION 10: Specify a target audience and/or the degree to which the activity is compulsory or voluntary.

ACTION 11: Identify persons who like eLearning activities and positively talk about them to their peers, and involve them in the process.

ACTION 12: Prepare/train eLearners about relevant skills needed in order to successfully attend an eLearning experience (e.g.: time management, self-directed learning, etc.).

ACTION 13: Clarify the possible advantage(s) of eLearning (compared to other training solutions).

ACTION 14: Create incentives and/or a recognition system for eLearning results (other than CME credits).

ACTION 15: Analyse eLearners' expectations and/or their previous experiences with eLearning.

ACTION 16: Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.

ACTION 17: Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).

ACTION 18: Specify how many CME credits the activity will be worth for the official credit collection

ACTION 19: Emphasize the possibility of being part of an online community of practice.

ACTION 20: Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits.

ACTION 21: Identify educational needs the healthcare professionals might have.

ACTION 22: Giving a formal diploma (or similar) to participants.

PART II

3. What type of eLearning activities does your hospital offer?
4. How many employees work in the hospital?
5. When did your hospital start offering eLearning activities?

- | |
|---|
| <ol style="list-style-type: none">6. Which is your role in the organization?7. Please specify your name8. Please specify your email address |
|---|

Locations and participants

The targets of the pilot phase were persons in charge of organizing the continuing education of healthcare professionals, statistics and marketing experts, and continuing education experts. The questionnaire was discussed with two CME managers (in two separate sessions), furthermore, it was discussed with an organizer of Continuing Medical Education activities at a congress center, and finally it was discussed with two experts in marketing and statistics during a unique session.

In order to organize the interviews, the persons were contacted by phone and asked if they were available for a meeting. In total four interviews took place. The hospitals selected for the interviews were the Ospedale Civico in Lugano (interview 1) and the Universitätsspital in Zürich (interview 2), both located in Switzerland. The other two sessions took place in Greece, where a third interview took place at the American-Hellenic Chamber of Commerce in Athens (in Greece congress centers mainly organize CME activities), and the fourth interview was held with two experts in the field of marketing and statistics at the University of Piraeus.

Results

The interviews allowed identifying problems and weaknesses of the questionnaire, and therefore allowed preparing the final version that was sent during the main phase. The methodology of the main phase is explained in the next section, the results of the survey are analyzed in the next chapter.

3.2.3 Main phase

Following the pilot phase, the main phase of the research was carried out. Two activities took place: a test and the final survey. The test phase allowed having an overview on the amount of responses and making last changes to optimize the survey. The final version of the questionnaire was sent by email to 1476 hospitals in the USA, to 1530 hospitals in Europe and to the mailing list of the French medical association (Le Magazine de l'UNAFORMEC) with 9200 addresses. To encourage participation, the questionnaire was translated into Italian, German and French. The following sections describe the changes made in the questionnaire in comparison to the pilot phase, the sampling and the survey procedures.

Questionnaire

The goal of the questionnaire (see Appendix A.4) was to collect data on the actions hospitals perform to inform healthcare professionals about Continuing Medical Education activities, which can take place through eLearning. The questionnaire of the pilot phase was modified for this final survey. Several questions were added, most were repositioned and some were slightly modified to be furthermore adapted to the healthcare setting. The changes were decided after discussing with the field experts met during the pilot phase and after having performed a test described in the following paragraphs.

Before sending the final version, the questionnaire was tested on a total of 200 hospitals (100 American and 100 European) in order to receive final critiques and comments. The selection of this sample is explained in the following sections. The participants had two weeks time to complete the survey: the test started on the 15th of November and finished on the 30th of November 2007. Due to the small responses received, several questions mainly concerning organizational matters about hospitals had to be removed to shorten the questionnaire. As already mentioned, due to the total lack of participation of the German,

French and Italian speaking countries to the test phase, the questionnaire and the introduction letter were translated into German, French and Italian for the main phase.

Following the suggestions of the pilot phase, the position of the general questions about eLearning (Part I) and the questions about the actions performed by the hospitals to inform the healthcare employees about eLearning activities (Part II) was reversed to allow the participants to have a better overview on the questions and to better understand the scope of the survey. Similarly to the prototype, the last questions collected information about the respondent (see Table 3.3).

Table 3.3 : Main phase questionnaire (test)

<p>PART I</p> <ol style="list-style-type: none">1. What type of eLearning activities does your hospital offer / use / allow?2. When available, please indicate what type of eLearning activity is mostly used.3. How many healthcare employees (subjected to CME regulations) work in the hospital?4. Please specify the number of beds in your hospital.5. When did your hospital start offering / using / accepting eLearning activities?6. In case your hospital is not offering eLearning activities at the moment, please specify if/when there are plans for introducing them.7. Please specify the following characteristics of your hospital:<ol style="list-style-type: none">a) Teaching status: Teaching/University hospital, Non-teaching hospital,b) Location: Urban hospital, Rural hospitalc) Type of institution: Governmental, Non governmental, Investor-owned (for-profit) <p>PART II</p> <ol style="list-style-type: none">8. For the following questions please indicate:<ol style="list-style-type: none">1) With YES or NO if your hospital is carrying out the following actions to prepare learners before releasing an eLearning activity

2) What is the IMPORTANCE of the action according to your experience

The 22 parameters were listed in order to answer question 7

9. Please add other actions you carry out or you think could be important to improve the learner's acceptance of eLearning events.

10. What is your role in the hospital? (e.g. chief learning officer, eLearning designer, training / learning manager)

11. What is your professional background? (e.g. physician, nurse)

12. Please specify your State and your Country:

13. In case you are interested in receiving the results of this research, or you are interested in receiving more questions, please specify your name; please specify your email address.

Question 2 was added to collect information on the mostly used type of eLearning activity. Question 4 was added to collect information on the size of the hospital (Polanczyk et al. 2002). Question 6 was added to identify potential plans of the hospitals to introduce eLearning. Question 7 on the characteristics of the hospital (teaching status, location, type of institution) was added in order to categorize the answers according to the type of hospital that participated to the survey (Polanczyk et al., 2002). Question 9 was inserted to allow the interviewees to include additional actions they thought to be important or they carry out, which were not available in the list. Question 6 of the pilot questionnaire has been divided into questions 10 and 11 on the role and the profession of the CME manager.

Final questionnaire

The questionnaire of the test phase was modified according to the results (see section 4.4.1) to create the final version (see Table 3.4). The differences to the test phase questionnaire are the following: Question 2 on the mostly used eLearning activities was excluded because it caused confusion with question 1 that was asking which types of eLearning activities are carried out. One question was added (question 3) in order to learn if the hospital offers or allows eLearning activities. Question 4 on the number of beds was replaced with one on the

number of employees in order to match the data of the research on eLearning readiness in organizations (Succi and Cantoni, 2008). The positioning of the questions was changed according to the collected suggestions: in the final version, first the general questions about the institution were inserted (questions 1 and 2), then several questions about eLearning in the hospital were asked (questions 3 - 6) followed by question 7 on the actions carried out to inform eLearners about available eLearning activities and on their importance. Finally the questions on the respondents were left in the same position (8-11). A last question on “comments and suggestion” was added in order to collect possible additional information and feedback about the questionnaire.

As already mentioned in the previous sections, the questionnaire was sent in an email message that contained an introduction text describing the research, a link to the online version of the questionnaire that could be answered via web, and a link to a PDF version in the corresponding language of the country that was being contacted, which could be downloaded and sent by mail or fax.

Table 3.4: Main phase questionnaire (final version)

<p>PART I</p> <ol style="list-style-type: none"> 1. How many healthcare employees (subjected to CME regulations) work in the hospital? 2. Please specify the following characteristics of your hospital: <ol style="list-style-type: none"> a) Teaching status: Teaching/University hospital, Non-teaching hospital, b) Location: Urban hospital, Rural hospital c) Type of institution: Governmental, Non governmental, Investor-owned (for-profit) 3. Does your hospital offer / use / allow eLearning activities? 4. What type of eLearning activities does your hospital offer / use / allow? 5. When did your hospital start offering / using / accepting eLearning activities? 6. In case your hospital is not offering eLearning activities at the moment, please specify

if/when there are plans for introducing them.

PART II

7. For the following questions please indicate:

- 1) With YES or NO if your hospital is carrying out the following actions to prepare learners before releasing an eLearning activity
- 2) What is the IMPORTANCE of the action according to your experience

The 22 parameters were listed in order to answer question 7

8. What is your role in the hospital? (e.g. chief learning officer, eLearning designer, training / learning manager)

9. What is your professional background? (e.g. physician, nurse)

10. Please specify your State and your Country:

11. In case you are interested in receiving the results of this research, or you are interested in receiving more questions, please specify your name, please specify your email address.

12. Any comments or suggestions

Survey procedures

On the 3rd of December the questionnaire was sent to the sample (3006 contacts) and it was left online until the end of March 2008. Two reminders were sent, the first one after two weeks and the second one 2 months later (on the 22nd of February). Due to the lack of responses, after having translated the questionnaire into German, Italian and French already during the test phase, on the 7th of February 2008 the questionnaire was added to the mailing list of the French medical association (Le Magazine de l'UNAFORMEC, 9200 addresses) with a short description of the research. Additionally, the respondents who answered (by email) that they would not be able to participate to the survey were contacted by email explaining that if necessary, they could be contacted by phone to fill out the questionnaire through phone conferencing. Nobody asked to be contacted.

The questionnaire was published in two versions: an online version created with the survey tool Dimension Net 4.0, and a version as PDF file. A link to both versions was sent to the hospitals by email.

Locations and participants

The following sections describe how the sample was selected. The final version of the questionnaire was sent by email to 1530 hospitals in Europe and to 1476 hospitals in the USA. The targets of the questionnaires were persons responsible for the continuing education of the hospitals' healthcare employees. Additional 200 hospitals were contacted for the test (100 from the USA, and 100 from Europe distributed as follows: Austria 12, Germany 54, Italy 4, Switzerland 20, UK 10). The results of the test and of the main phase are described in section 4.4.

Selection of 1530 hospitals in Europe

The sample was selected according to the results of the pre-phase (see section 4.2). Only those countries were selected where, according to this first phase, eLearning is officially accepted (by the health ministry or by the medical association) as a way of collecting CME credits. Furthermore, all countries that do not allow hospitals as providers of eLearning activities were removed. Among the remaining countries, only the members of the European Hospital and Healthcare Federation (HOPE) were selected in order to select hospitals that follow certain quality standards. HOPE is active in the improvement of healthcare services and in reaching high standards in European hospitals. Countries with at least 100 hospitals were selected (Austria, Germany, Italy, Switzerland, and United Kingdom). The hospitals were finally selected from the websites of each country's member of HOPE (represented by the country's hospital association or health ministry). The total number of hospitals was 3500; the samples were divided among the countries as shown in Table 3.5, selecting every second hospital from alphabetical lists:

Table 3.5: European sample

<i>Country</i>	<i>Nr. of Hospitals</i>	<i>Sample</i>
Austria	266	133
Germany	2071	1036
Italy	200	48
Switzerland	400	200
UK	650	113
TOTAL	3500	1530

Out of the 1530 contacted hospitals, 211 email messages returned as undelivered. In total, 1319 hospitals were successfully contacted.

Selection of 1476 hospitals in the USA

To select a sample of American hospitals, at first states with at least 100 hospitals members of the Joint Commission (www.jointcommission.org) were chosen (Alabama, California, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, Wisconsin). The hospitals were selected from an alphabetical list of 3360 hospitals ordered by State (every second hospital was chosen). The list contained such information as mail addresses and URLs. In total 1476 hospitals were selected, every second hospital was chosen.

Table 3.6: American sample

<i>State</i>	<i>Nr. of Hospitals</i>	<i>Wanted Sample</i>	<i>Final Sample (nr. of hospital addresses found)</i>
Alabama	103	52	41
California	372	186	164
Florida	219	110	97
Georgia	169	85	83
Illinois	184	92	81
Indiana	115	58	49
Kentucky	108	54	52
Louisiana	136	68	59
Massachusetts	109	55	55
Michigan	146	73	68
Missouri	106	53	47
New Jersey	106	53	49
New York	227	114	99
North Carolina	124	62	53
Ohio	212	106	91
Pennsylvania	212	106	87
Tennessee	139	70	57
Texas	340	170	143
Virginia	111	56	52
Wisconsin	122	61	49
TOTAL	3360	1684	1476

Answers

The answers were collected by email, mail and fax; they are divided as follows:

- USA: 64 answers
- Europe: 34 answers
- No specified location: 5 answers
- Mailing list: no answers were collected. This may be due to the fact that not all readers were necessarily working for hospitals.

The results are thoroughly described in Chapter 4.

3.3 Data collection tools

In order to collect the data of the pre-phase, the software *Perseus Survey Solutions 6* was used, which allowed creating and publishing the questionnaire online and on printed media. The same software was used to collect and analyze the data. As previously mentioned, in order to collect the data of the main phase, the tool *Dimension Net 4.0* was used, which allowed creating and publishing the questionnaire online. To analyze the collected data, the statistical analysis software *SPSS 16.0* was used.

3.4 Statistical analysis

The collected data is analyzed in Chapter 4 and compared to the findings of Succi and Cantoni (2008).

Chapter 4 - Results

4.1 Introduction

This Chapter illustrates the results of the research; it starts by describing the findings of the pre-phase (section 4.2), it illustrates the findings of a literature review that identified the parameters to create an eLearning Readiness Index for the hospital sector (section 4.3), it continues with the results of the test phase (section 4.4.1) and finishes with various statistics on the data collected during the main phase (4.4.2 and further).

4.2 Continuing Medical Education in Europe and the USA - pre-phase results

This section explains the results of the first phase of the analysis during which the European CME systems were thoroughly studied in order to understand the procedures involved in the continuing education of medical professionals. As already anticipated in Chapter 3, the importance of this phase was to allow gathering information on the diffusion of eLearning in European CME and use the results for the main phase.

4.2.1 Pre-phase results

Among the 27 National Accreditors of each country contacted during this phase (as already mentioned in Chapter 3, the National Accreditors correspond to Medical Associations or Health Ministries of EU and EFTA countries), 23 answered the questionnaire (available in Appendix A.1). The following seven tables present the collected results, including those of the USA which were added thanks to the outcome of an article written on the topic (Bachmann et al., 2006). In order to achieve the purpose of this research, only the questions relevant to eLearning and the main phase of the research were analyzed.

Table 4.1 presents the most common terms used to refer to electronic learning in CME; Table 4.2 contains definitions of eLearning in the medical context; Table 4.3 shows in which countries eLearning is eligible for CME and what types of activities are allowed; Table 4.4 explains which countries have put restrictions on the amount of eLearning credits that the healthcare professionals can collect and what kind of restrictions occur; Table 4.5 illustrates the providers of online activities; Table 4.6 explains what procedures must be followed by the providers to add an eLearning event to the list of official CME events; and Table 4.7 shows for which countries CME is obligatory or voluntary.

At first, the vocabulary used by the National Accreditors was studied. The most common term used to address online learning activities is *eLearning* (see Table 4.1). The following 13 countries officially use this term: Austria, Belgium, Denmark, Finland, Germany, Ireland, Luxembourg, Norway, Slovakia, Slovenia, Sweden, Switzerland and the United Kingdom. The second most used expression is *distance learning* used by the following 8 countries: Germany, Hungary, Italy, Malta, Norway, Slovakia, UK and the USA.

Table 4.1: Vocabulary used for eLearning (Bachmann et al., 2006)

<i>Country</i>	<i>Expression or phrase used to describe elearning</i>
Austria	eLearning
Belgium	eLearning
Cyprus	Online Learning
Danmark	eLearning
Estonia	N/A
Finnland	eLearning
France	eFMC: Formation Médicale Continue sur Internet eCME: Electronic Continuing Medical Education
Germany	eLearning, Distance Learning
Greece	N/A
Hungary	Distance Learning
Ireland	eLearning
Italy	Formazione a Distanza (FAD)
Luxembourg	eLearning, Internet

<i>Country</i>	<i>Expression or phrase used to describe elearning</i>
Malta	Distance Learning
Netherlands	Programma Individuele Nascholing (PIN)
Norway	eLearning, Distance Learning, Online education
Poland	Online education
Portugal	N/A
Slovakia	eLearning, Distance Learning
Slovenia	eLearning
Sweden	eLearning
Switzerland	eLearning
United Kingdom	eLearning, Distance Learning, Online Learning, Computer assisted learning
United States	Distance Learning

Secondly, official definitions of eLearning were identified. The only European National Accreditor that has given an official definition of eLearning activities in CME is the Austrian Medical Association, the American Medical Association has given a definition of distance learning in CME. The other countries do not provide any legal nor formal definition of this type of activity. The definitions can be found in Table 4.2. In both of them, the main concern is around the means that can be used to participate to eLearning in CME.

Table 4.2: Legal definition of eLearning as used in CME (Bachmann et al., 2006)

Austria	The word eLearning describes general educational material and the training, fully or partially available or possible through electronic means. The internet, an intranet or simple multimedia platforms like CD-ROMs or DVDs can be used (Österreichische Akademie der Ärzte, 2008).
United States	The application of information technology (and infrastructure) to educational and student-related activities linking teachers and students in differing places. The student and instructor are physically separated by any distance. All communications are mediated by some type of electronic means in real or delayed time. Distance education takes place when a teacher and student(s) are physically separated, and technology (i.e., audio, video, computers, print) is used to bridge the instructional gap (United States Distance Learning Associations, 2006).

Furthermore, the accreditation of eLearning and the eligibility of the activities were studied. Out of the 24 analyzed countries, 17 (71%) accept eLearning as an eligible CME activity

(Table 4.3): Austria, Belgium, Cyprus, Estonia, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Slovakia, Slovenia, Switzerland, United Kingdom and USA. Online courses and the use of digital media are the most frequently accepted activities (used respectively in 14 and 10 countries), followed by the reading of relevant online articles (accepted in 9 countries). Less frequently accepted activities are the participation to videoconferences or to discussion forums (both can be found in 5 countries). Austria and Germany accept any type of eLearning activity under the condition that it is accompanied by an evaluation to prove individual participation.

Table 4.3: eLearning and accreditation (Bachmann et al., 2006)

<i>Country</i>	<i>Is eLearning eligible for accreditation?</i>	<i>Types of eligible eLearning activities</i>
Austria	yes	Reading online articles, participation to interactive online courses. The online offers must correspond to the DFP criteria and it is necessary to answer online questions about the contents in order to prove one's participation.
Belgium	yes	Online courses.
Cyprus	yes	Online courses.
Estonia	yes	Online courses, CDs – DVDs/other digital media, Participation to videoconferences, Participation to discussion forums, Reading articles in the internet, Reading emails about relevant material. No limits.
Finland	no	
France	yes	Online courses, CDs – DVDs/other digital media, Participation to discussion forums, Reading articles in the internet.
Germany	yes	Online courses, CDs – DVDs/other digital media, Participation to videoconferences, Participation to discussion forums, Reading articles in the internet, Reading emails about relevant material. Only in combination with an evaluation of the learned materials.
Greece	no	It is under study from EACCME – UEMS.
Hungary	yes	Online courses, Reading articles in the internet
Ireland	no	Under pilot study at present.

<i>Country</i>	<i>Is eLearning eligible for accreditation?</i>	<i>Types of eligible eLearning activities</i>
Italy	yes	At the moment it is in a experimental fase, the providers decide which activities are accepted
Luxembourg	yes	Online courses, CDs – DVDs/other digital media, Participation to videoconferences, Participation to discussion forums, Reading articles in the internet, Reading emails about relevant material
Malta	no	
Netherlands	yes	Online courses, CDs – DVDs/other digital media
Norway	yes	Online courses, CDs – DVDs/other digital media, Participation to videoconferences, Participation to discussion forums, Reading articles in the internet.
Poland	yes	Online courses, interactive digital platform.
Portugal	no	
Slovakia	yes	Online courses, CDs – DVDs/other digital media, Reading articles in the internet, Reading emails about relevant material.
Slovenia	yes	It is not specified yet which activities are eligible
Sweden	no	
Switzerland	yes	New media, in particular interactive electronic and audio visual learning methods (i.e. CDs, DVDs, educational software, internet, etc.)
United Kingdom	yes	Online courses, CDs – DVDs/other digital media, Participation to videoconferences, Reading articles in the internet.
United States	yes	Courses are offered that earn credit hours (through CDs, DVDs, educational software, internet, etc.) toward certification in the American College of Healthcare Executives.

Denmark did not provide an answer.

Moreover, the restrictions on eLearning credits for the members of the National Associations were studied. Seven countries (29%) have put restrictions on the CME credits: Austria, France, Germany, Hungary, Poland, Switzerland, and USA (see Table 4.4). Ten countries (Belgium, Cyprus, Estonia, Italy, Luxembourg, the Netherlands, Norway, Slovakia, Slovenia and the United Kingdom) do not set any restrictions on CME activities at

this time. Six countries (Finland, Greece, Ireland, Malta, Portugal and Sweden) do not admit eLearning activities. No data is available about Denmark. The types of restrictions that were observed are available in Table 4.4. In France, Germany, Hungary, Switzerland and in the USA eLearning is mainly compared to individual learning (for example the reading of articles), and a few number of credits can be collected in relationship to the total. Exceptions are Austria and Poland where respectively two thirds and half the credits can be collected through eLearning.

Table 4.4: Restrictions on eLearning credits (Bachmann et al., 2006)

<i>Country</i>	<i>Restrictions</i>
Austria	Maximum 2/3 of the needed credits (100 out of 150 credits to collect in 3 years)
France	eLearning is equal to individual learning (reading articles). Two credits per year (max 10 in 5 years) for every subscription to a medical magazine. Four credits if the magazine follows the criteria of the CNFMC (Conseils Nationaux de la Formation Médicale Continue), maximum 40 in 5 years. Total number of credits to accumulate: 250 in 5 years.
Germany	One point per learning module and 30 points in 3 years for reading relevant online journals and texts. Total number of credits to accumulate: 150 in 3 years or 250 in 5 years.
Hungary	Maximum 10 credits per year on eLearning. Total number of credits to accumulate: 250 in 5 years.
Poland	Tests - 0,2 point per question, max. 100 points in 4 years. Total number of credits to accumulate: 200 in 4 years.
Switzerland	Specialist Medical Societies (SMS) decide how to manage eLearning activities. At the moment 9 out of 43 restrict the participation to eLearning activities as follows: 3 limit the number of credits to a maximum of 10 credits, one to a maximum of 15 and one to a maximum of 20. Four SMS consider eLearning as an equal activity to reading journals and texts. Total number of credits to accumulate: 50 plus 30 of individual learning in 1 year.
United States	The American College of Healthcare Executives (ACHE) limits the number of courses that one can earn to 6 ACHE (American College of Healthcare Executives) Category I credit hours which can be applied toward advancement, recertification, or reappointment within the college. Total number of credits to accumulate: 250 in 5 years.

The providers of eLearning courses (Table 4.5) do not differ from the ones who offer other activities (Bachmann et al., 2006). In 6 countries (Cyprus, Estonia, Germany, Luxembourg, Poland, Switzerland) any institution or organization (medical association, hospitals, universities, individuals, etc.) can provide eLearning activities. In Austria, the Netherlands, Italy, the United Kingdom and the United States, only accredited providers can supply eLearning activities. In the remaining countries mainly medical associations, universities and professional organizations are allowed to create electronic learning events.

Table 4.5: Providers of online activities (Bachmann et al., 2006)

<i>Country</i>	<i>Providers of online activities</i>
Austria	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Universities, Individuals, however, the providers must be accredited.
Belgium	Medical Associations, Professional organizations, Universities.
Cyprus	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Individuals.
Estonia	Anybody can provide a course.
France	Medical Associations, Universities.
Germany	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Universities, Individuals.
Hungary	Medical Associations, Professional organizations, Universities, Medical societies.
Italy	Selected providers by the health ministry.
Luxembourg	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Individuals.
Netherlands	Colleges (i.e. specialist scientific organizations), the providers must be accredited.
Norway	Medical Associations, Hospitals, Professional organizations, Universities.
Poland	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Individuals .
Slovakia	Medical Associations, Professional organizations, Universities, Individuals
Switzerland	Anybody can provide a course.

<i>Country</i>	<i>Providers of online activities</i>
United Kingdom	Anybody can provide a course, Medical Associations, Hospitals, Professional organizations, Individuals. There can be a range of providers. However, providers need to seek accreditation from the Royal Colleges.
United States	Only those seminar providers approved by the American College of Healthcare Executives can offer distance learning courses through the ACHE.

Denmark, Finland, Greece, Ireland, Malta, Portugal, Slovenia and Sweden did not specify this aspect.

To make eLearning activities official, different rules apply to the countries (Table 4.6). In Austria, the Netherlands, Italy, the UK and the USA the provider must be accredited in order to create and offer eCME activities. In Germany and in Slovakia the Medical Association must recognize the activities. In Switzerland the Medical Societies set regulations for each medical specialty. In Belgium and in Italy quality guidelines must be followed. In Cyprus a participation proof with information on the collected CME credits is needed.

Table 4.6: Procedures for officializing an eLearning activity (Bachmann et al., 2006)

<i>Country</i>	<i>Rules to add an eLearning event to the list of official CME activities</i>
Austria	The CME providers must be accredited and follow the general criteria for all CME events provided in the regulations.
Belgium	Independence (from industries), relevance of the contents, questionnaire, certifiable participation.
Cyprus	To be accompanied from official paper (proof) with the CME grades from the organizer party who has to be relevant with the doctor's specialty.
Germany	Online activities must be recognised by the Landerärztekammer.
Italy	The CME providers must follow a quality guideline for distance courses.
Luxembourg	Accreditation criteria are being discussed.
Netherlands	The organization itself has to be accredited.
Slovakia	Approval by SACCME-Slovak Accreditation Commity for CME.
Switzerland	Individual regulation according to the continuing education programs of the Specialist Medical Societies.
United Kingdom	Accreditation by relevant Royal College.

<i>Country</i>	<i>Rules to add an eLearning event to the list of official CME activities</i>
United States	The CME providers must be accredited and follow the general criteria for all CME events provided in the regulations as published by the American College of Healthcare Executives.

Danmark, Estonia, Finland, France, Greece, Hungary, Ireland, Malta, Norway, Poland, Portugal, and Slovenia did not provide any rules.

Finally, Table 4.7 shows for which countries and professions CME is *mandatory by law* (the healthcare professionals are required by law to maintain their professional competence) or *semi mandatory* (regulated by the profession, there is no re-licensing, but compliance with CME standards is necessary).

Table 4.7: Professions and participation to CME* (Bachmann et al., 2006)

	<i>Physicians</i>	<i>Dentists</i>	<i>Nurses</i>	<i>Obstetricians</i>
<i>Austria</i>	mandatory			
<i>Belgium</i>				
<i>Cyprus</i>				
<i>Denmark</i>				
<i>Estonia</i>				
<i>Finland</i>				
<i>France</i>	mandatory	mandatory		
<i>Germany</i>	mandatory	mandatory	mandatory	
<i>Greece</i>				
<i>Hungary</i>	mandatory	mandatory	mandatory	mandatory
<i>Ireland</i>				
<i>Italy</i>	mandatory	mandatory	mandatory	mandatory
<i>Luxembourg</i>	mandatory	mandatory		
<i>Malta</i>				
<i>Netherlands</i>	mandatory			
<i>Norway</i>	semi mandatory			
<i>Poland</i>	mandatory	mandatory		
<i>Portugal</i>				
<i>Slovakia</i>				
<i>Slovenia</i>	mandatory	mandatory		
<i>Sweden</i>				
<i>Switzerland</i>	semi mandatory			
<i>United Kingdom</i>	semi mandatory			
<i>United States</i>	mandatory			

*Where not specified, CME is voluntary.

According to the results, CME is mandatory only for physicians in 3 countries (Austria, the Netherlands, and the USA), it is mandatory only for physicians and dentists in 4 countries (France, Luxembourg, Poland and Slovenia), it is mandatory only for physicians, dentists and nurses in 1 country (Germany) and it is obligatory for all healthcare professionals in Italy and Hungary. CME is semi mandatory for physicians in 3 countries (Norway, Switzerland and the United Kingdom). In the remaining 11 countries, the healthcare professionals are not obliged to collect CME credits. The research and the questionnaires focus on the continuing medical education of all healthcare professionals.

4.2.2 Pre-phase conclusions

The findings support the view that eLearning is spreading at high rates in the medical field (Hall, 2002; Long, 2004; Sklar, 2006; AACME in Honorio, 2005). As shown by the collected questionnaires, in most of the above listed countries (17 out of 24) eLearning is eligible as CME activity (Table 4.3). There is uncertainty in the use of this learning style: there is no universal definition of eLearning for the field (Table 4.2), no common idea on the number of credits to be collected (Table 4.4), nor international guidelines on the technologies that can or should be used (Table 4.3). The list of possible eLearning providers, however, is clearer (Table 4.5); the majority seems to agree on the fact that medical associations, professional organizations, hospitals and universities should provide courses. The survey presented in the following sections focuses on Europe and on the USA because of the sample studied in the pre-phase. In order to carry out the research it was necessary to select countries that accept eLearning in CME.

The next section presents the results of a thorough literature review on eLearning acceptance in CME and lists 22 factors enabling eLearning acceptance in CME. The parameters were used to create the research questionnaire and an eLearning Readiness Index for the Continuing Medical Education of healthcare professionals in hospitals.

4.3 ELearning acceptance in CME

In order to verify if CeLeRI (Succi and Cantoni, 2008) is applicable to hospitals and possibly identify new criteria necessary for this type of organization, two steps were followed: a *description* of the criterion according to the authors was given, and an *example* found in the literature was written to better explain the description.

In order to identify the criteria in the literature, a thorough research in search engines and medical journals was performed to find relevant articles. The following search engines have been used (in order of usefulness): Google, MedNet, SCIRUS - for scientific information only, Science direct, Elearningeuropa.info. The search engines that did not give any result were omitted in the above list. The following medical journals were studied: JMIR (Journal of Medical Internet Research, www.jmir.org, the articles from 1999-2007 were analyzed), MedEdOnline (Medical Education Online, www.med-ed-online.org, the articles from 1996 – 2008 were analyzed) and the Journal of Continuing Education in the Health Professions (the articles from 1999-2007 were analyzed). A combination of the keywords presented in Table 4.8 was used to find relevant texts in the eCME context.

Table 4.8: Research keywords

eLearning	Drop out	CME
Distance learning	success	e-learning
Online	eCME	Electronic learning

In the literature, the following enabling factors were identified (Table 4.9):

Table 4.9: eLearning acceptance parameters

1 - Underline the relevance between the eLearning activity and the learner's specialty or activity in the job [PERCEIVED USEFULNESS]	
Author	Valenzeno D.P. et al., 2000; Del Favero et al., 2006; Ungaro F. et al., 2006
Description	Healthcare professionals can belong to various disciplines or professions (physicians, surgeons, dentists, psychologists, nurses...); therefore eLearning activities might be directed to different targets. The acceptance of online courses can be compromised if the target is uncertain.
Example	Different learning modules are available for learners with various professional backgrounds.
2 - Encourage managers in supporting and getting involved in eLearning activities [CORPORATE MOTIVATION]	
Author	Curran V. et al., 2003; Del Favero et al., 2006
Description	Managerial or supervisor involvement in eLearning activities promotes user participation.
Example	The participation of managers or supervisors in online discussion influences the use of the online discussion area by participants.
3 - Provide technical and content support during the eLearning activity [SUPPORT]	
Author	McClennen S. et al., 2003; Fordis M. et al., 2005; Bachmann et al., 2004; Parry D., 2001; Del Favero A. et al., 2006; Rosignoli G. et al., 2006
Description	The presence of expert feedback about the contents or a technical support can favor eLearning acceptance.
Example	Direct feedback from the course's authors is available. Users who provide an e-mail address and submit questions or disagreements are promptly answered.
4 - Specify the expected changes in the medical practice or the behavioural/performance goals of the eLearning activity [GOAL COMMITMENT]	
Author	McClennen S. et al., 2003; Bachmann et al., 2004; Linetti M., 2006
Description	Describe the impact the eLearning course is expected to have on the activities performed in the profession.
Example	Develop and maintain electrocardiography reading proficiency.

5 - Specify the details of the eLearning activity (starting date, due date, contents, objectives, outputs, requirements, assignments, evaluation procedures, etc.) [PREPARATION]	
Author	Curran V. et al., 2003; Langille et al., 1998; Parry D. et al., 2001; Bachmann et al., 2004; Linetti, 2006
Description	The eLearners have been informed about the organizational details of the eLearning activities.
Example	The participants are informed about the contents, appointments and duration of the course, and a list with the components of the web-based learning system is available.
6 - Specify the goals the hospital wants to achieve by proposing the eLearning activity [INSTITUTIONAL COMMITMENT]	
Author	Parry D. et al., 2001; Ungaro F. et al., 2006
Description	The goals the hospital wants to achieve are perceived as important.
Example	Raising health professionals' understanding of health informatics and computer technology, including: the effective use of common software, communication tools, and some of the concepts underlying the use of computers in health care.
7 - Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices [CULTURE]	
Author	Linetti M., 2006
Description	Elearning acceptance is influenced by specific cultural beliefs or the tradition of a company.
Example	The effort put into CE must not compromise other professional activities, even though CME increments the participant's skills and increases the value of the company.
8 - Use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.) [COMMUNICATION BEHAVIOUR]	
Author	Valenzeno D.P. et al., 2000; Holtrop J.S., 2001; Langille et al., 1998; Fordis M. et al., 2005; Colombo F., 2006
Description	Elearning activities are promoted through communication channels.
Example	Promotion through emails sent to mailing list of professionals interested in the topic.

9 - Specify a target audience and/or the degree to which the activity is compulsory or voluntary [VOLUNTARINESS]	
Author	Fordis M. et al., 2005
Description	Voluntariness influences eLearning acceptance and the way eLearners study.
Example	To be eligible for the study, physicians were required to work full-time or part-time in a primary care setting. Physicians who were unwilling to participate in the assigned educational program were excluded.
10 - Set specific time restrictions/deadlines for the eLearning activity [TIME]	
Author	Curran V. et al., 2003; Dobida D., 2005; Del Favero et al., 2006; Del Favero et al., 2006
Description	Time scheduling might help eLearners participating to the activities.
Example	Online videoconferences are scheduled (one weekly appointment) and the duration of the online course has been set to two semesters.
11 - Identify persons who support the activities in the different branches/locations; [PEER COMMUNICATION]	
Author	Not found in the literature
Description	Peer communication helps eLearners to understand eLearning.
Example	A physicians attends an eLearning event s/he liked and talks positively about it to her/his colleagues.
Comment	Was maintained in the research: it is an important factor which was not found in the literature but might have an important impact on eLearning acceptance.
12 - Prepare/train eLearners about relevant issues and skills needed in order to successfully attend an eLearning experience (i.e. time management, self-directed learning, etc.) [TRAINING]	
Author	Langille et al., 1998
Description	Information on the eLearning activities and on the required skills necessary to participate is given to prepare the eLearners to attend the course.
Example	A letter is sent to explain the contents and the activities that will take place.

13 - Clarify the possible advantage(s) of eLearning (compared to other training solutions) [P. RELATIVE ADVANTAGE]	
Author	Rogers, 2003; Valenzeno D.P. et al., 2000; Drahi E., 2006; Curran V. et al., 2003; Langille et al., 1998; Dobida D., 2005
Description	ELearning must be perceived at least as effective and efficient as other training solutions.
Examples	<ul style="list-style-type: none"> • Students can learn the material at their own time and pace and in the order that makes the most sense to them. • Participation to face-to-face CME is problematic for several physicians due to the difficulties in arranging practice or hospital coverage, spending time away from family, and the cost of travel and attendance.
14 - Create incentives and/or a recognition system for eLearning [INCENTIVES]	
Author	Rosset A., 2006; Fordis M. et al., 2005
Description	Incentive systems associated to eLearning activities can increase acceptance.
Example	Bonuses paid to physicians who follow a strategy of error reduction and improvement of care.
15 - Track eLearners' expectations and/or their previous experiences with eLearning [EXPERIENCE AND EXPECTATIONS]	
Author	Curran V. et al., 2003
Description	Elearners' prior experience with eLearning courses influences their attitude towards new computer-assisted activities.
Example	Professionals with bigger knowledge in computer and online services, and with previous experience with computer-assisted CME, give higher evaluations to this type of activity than counterparts with less computer experience.
16 - Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity [P. OBSERVABILITY]	
Author	Rogers, 2003; Allen M. et al., 2003; Bachmann et al., 2004; Gnocato V., 2006; Rosignoli G. et al., 2006
Description	The eLearning tools are observable before the activities start.
Example	Possibility to participate to a 1-hour orientation session before the eLearning activity starts.

17 - Set guidelines to create the correct environment where the eLearning activity should take place (e.g., space, noise, interruptions, participation from home/office, etc.) [PLACE]	
Author	Curran V. et al., 2003
Description	The necessary environmental conditions are created in order to facilitate the participation to eLearning activities.
Example	Internet connectivity should be available in the same room the teleconferencing activities take place.
NEW PARAMETERS:	
18 - Specify how many CME credits the activity will be worth for the official credit collection	
Author	Allen M., 2003; Fordis M. et al., 2005; Del Favero et al., 2006
Description	Information is available on the CME credits the course offers.
Example	One CME credit is assigned for every completed module.
19 - Emphasize the possibility of being part of a community of practice	
Author	Drahi E., 2006; Rossett A., 2006; Ferrari M., 2006
Description	The creation of communities of practice can increase eLearning acceptance.
Example	Information on the possibility (or in certain cases the obligation) of participating to in-presence meetings, chats, forums, etc. that will allow interaction, exchange of ideas and clarifications.
20 - Provide a list of courses that describes contents (activities, course authors and teachers) and number of credits (self-service model)	
Author	Ferrari M., 2006; Linetti M., 2006
Description	A list of all the available courses (and topics) can facilitate the selection and as a consequence the participation to eCME events.
Example	A list of eLearning products is available for healthcare professionals to choose the most appropriate event to participate to.

REVIEWED PARAMETERS:	
21 – Identify the educational needs the healthcare professionals might have [NEEDS]	
Author	Rogers, 2003; Langille et al., 1998
Description	Learners’ needs and problems can be identified to create appropriate eLearning activities.
Example	Focus groups techniques can be used to identify areas of learning that would meet the participant’s needs.
22 – A quality output is given to the participants (e.g. a diploma) [QUALITY OUTPUT]	
Author	Parry D. et al., 2001; Dobida D., 2005
Description	Elearners perceive that eLearning offers them a quality output.
Example	A diploma on the studied topic is offered by a known University.

Most enabling parameters identified in the corporate sector can also be identified in the literature on eLearning acceptance in hospitals. The only exception is the peer communication, which was maintained because of its potential importance in eLearning acceptance.

Several new parameters were identified which are strictly linked to the medical field:

- Specify how many CME credits the activity will be worth for the official credit collection
- Emphasize the possibility of being part of a community of practice
- Provide a list of courses that describes contents (activities, course authors and teachers) and number of credits (self-service model).

Two parameters were reselected from the first list with 42 enabling factors (Appendix A.12, Succi, 2007; Succi and Cantoni, 2008), showing to be treated as separate acceptance enabling factors in the literature review:

- Identification of needs and problems (identify the educational needs the healthcare professionals might have)
- Handing out of a quality output (e.g. a diploma).

Starting from the enabling parameters of Table 4.9, a list of entailed actions and a final *eLearning Readiness Index for hospitals* was created thanks to the interviews and the survey. The methodology of these activities is presented in Chapter 3 and the results are discussed in Chapter 5.

4.4 Results of the eLearning acceptance survey

The following sections describe the results of the data collected during the survey. At first the results of the pilot phase are briefly explained (section 4.4.1), followed by the results of the main phase (from section 4.4.2 on).

4.4.1 Test phase data collection

As already described in Chapter 3 (section 3.2.3), the first version of the questionnaire (see Table 3.3) was sent to 200 hospitals (in the USA and in Europe) in order to be tested. During this phase 4 answers were collected.

Question 1: Types of eLearning activities

The elements of this question were identified thanks to question 11 of the pre-phase (see Appendix A.1). All 4 respondents indicated that their hospitals allow online courses in their

CME activities, 75% allow the use of digital media like CDs and DVDs, 75% selected videoconferences and 25% selected online articles and the reading of relevant emails. Nobody selected “other” so it was not necessary to add any other type of activity in the main phase, and nobody selected the participation to discussion forums or the reading of articles in the internet.

Question 2: Mostly used eLearning activity

The answers were selected as follows: 25% selected online courses, 25% the participation to videoconferences, 25% the reading of relevant emails and 25% selected “other” adding as comment “no eLearning available”. This question was taken out due to the similarity to question 1 and in order to decrease the length of the questionnaire.

Question 3: Nr. of employees

An equal number for each category could be observed from the results. The chosen range was proven to be ideal for the main phase.

Question 4: Number of beds

This question revealed that 2 out of the 4 respondents were from hospitals with less than 100 beds, 1 hospital had 200-300 beds and the last had more than 600. As already mentioned it was replaced with a question on the number of employees in order to compare the data with the findings of Succi and Cantoni, 2008.

Question 5: Year when eLearning started

One hospital from this sample answered that it was offering eLearning activities since 1995 or earlier, 2 selected respectively 2005 and 2006, and the last answered that eLearning activities are not available yet. The results match the findings of the main phase.

Question 6: In case your hospital is not offering eLearning activities at the moment, please specify if/when there are plans for introducing them:

The respondent that in question 5 answered that no eLearning activities are available yet, declared that there are no plans at the moment to introduce them in the future.

Question 7: Characteristics of the hospital

All 4 respondents of this sample were non-teaching hospitals, 3 from a rural setting, only one was urban, while 2 were non-governmental and 2 for profit.

Question 8: Actions carried out and their importance

Too few data was collected in order to comment this question.

Question 9: Other actions

No suggestions were given; the question was taken out from the main questionnaire.

Question 10: Role

Among the respondents there were: a director of the Education Services, a director of the Medical Staff Services and a web developer. One did not answer this question.

Question 11: Profession

The following answers were written: bachelor of science in education, medical technologist, “no medical background” and nurse. The nature of these answers should have suggested providing the respondents with multiple choice answers. The problem was not detected on time and the question was not modified for the main phase.

Question 12: Country

All the answers to the test questionnaire came from the USA.

At this point no conclusions can be offered due to the small amount of answers. The following sections present the main phase of the research.

4.4.2 Main phase data collection

During this phase a total of 103 answers were collected out of the 3006 questionnaires that were sent by email and the 9200 addresses contacted through the mailing list of the French Medical Association (UNAFORMEC). The amount of responses is small despite the various attempts to obtain answers. From the previous phases 6 questionnaires were collected, distributed as follows: two questionnaires were compiled during the interviews with the Swiss hospitals (pilot phase), and four questionnaires were collected during the test phase made on a sample of 100 hospitals. The analysis in this section uses the data collected during the main phase. Rigorous statistical testing cannot be used to ascertain whether the two samples of the test and the main phase were drawn from the same population because the test phase sample was very small (size = 4). Therefore, the four collected answers of the test are not included in the following analysis. A list with the 58 available variables can be found in Appendix A.5. Three variables were taken out from the test phase to create the main phase questionnaire: “used eLearning activities”, “number of beds” and “more actions”. The differences between the test and the main questionnaire were explained in section 3.2.3. The following points present the results of this phase.

4.4.3 Descriptive analysis

This section illustrates the descriptive analysis of the data collected during the main phase. The following points illustrate the results of the questions.

Countries distribution (question 10)

As already mentioned in Chapter 3, the sample was distributed as shown in Table 4.10.

Table 4.10: Countries distribution (question 10)

<i>Country</i>	<i>Sample</i>	<i>Frequency</i>	<i>Percent</i>
Austria	133	1	1.0
Germany	1036	10	9.7
Italy	48	6	5.8
Switzerland	200	10	9.7
UK	113	7	6.8
USA	1476	64	62.1
N/A	-	5	4.9
Total	3006	103	100.0

Most questionnaires were compiled from the USA (62.1%), while 37.9% arrived from European countries distributed as follows (see also Figure 4.1): Switzerland 10%, Germany 10%, United Kingdom 7%, Italy 6% and Austria 1%.

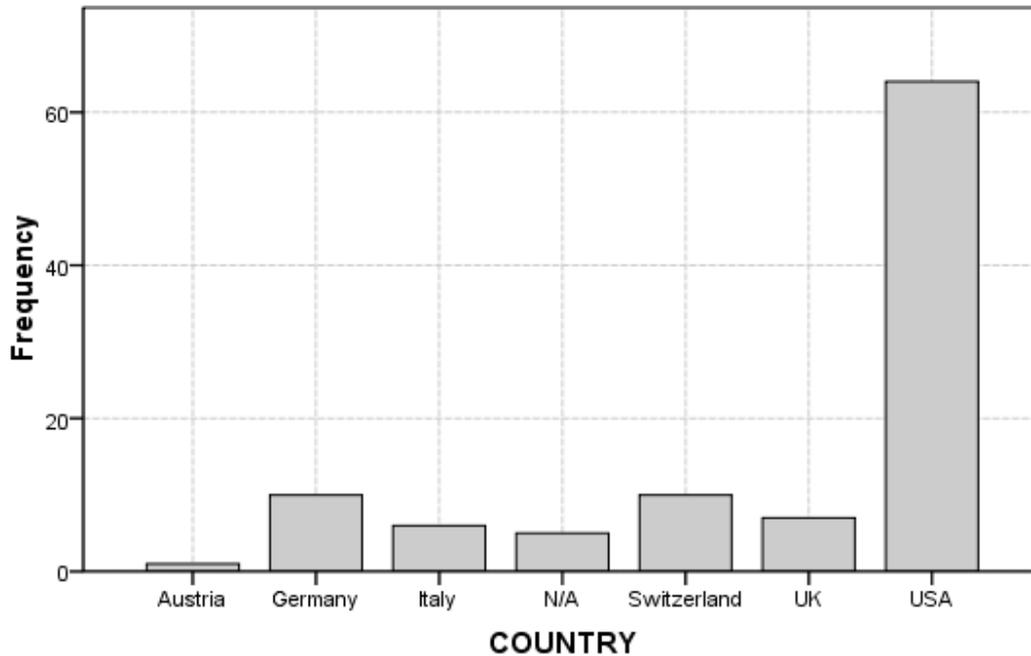


Figure 4.1: Countries (question 10)

Number of employees working in the hospital (question 1)

Most respondent hospitals (39.8%) are small sized (1-500 healthcare personnel are employed, see Table 4.11), followed by medium size hospitals with 1001 to 5000 employees (28.2%), and small to medium hospitals with 501-1000 employees (20.4%). One respondent did not answer the question.

Table 4.11: Employees (question 1)

<i>Nr. Employees</i>	<i>Frequency</i>	<i>Percent</i>
1-500	41	39.8
501-1000	21	20.4
1001-5000	29	28.2
5001-10000	5	4.9
10001-15000	2	1.9
> 15000	4	3.9
Total	102	99.0
Missing	1	1.0
Total	103	100.0

Figure 4.2 clearly represents the results; 88.4% of the answers were given by hospitals with less than 5000 employees.

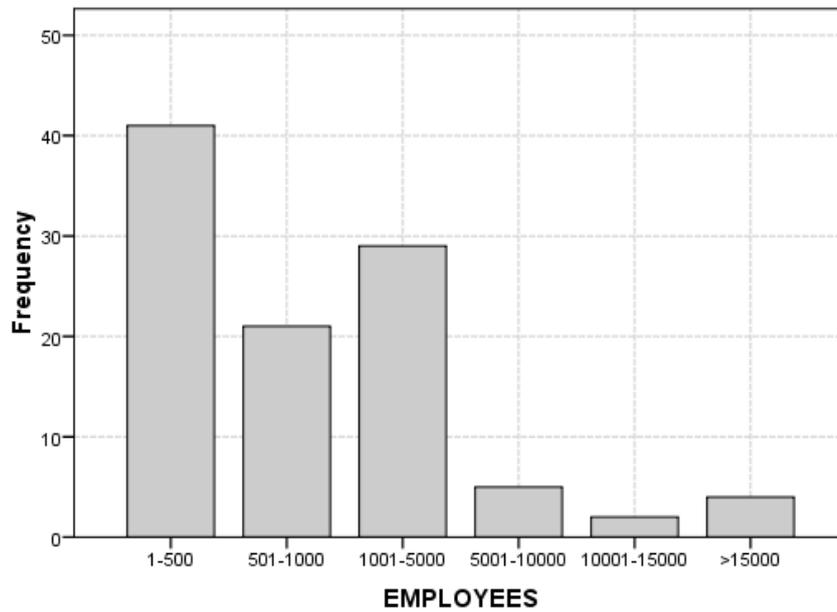


Figure 4.2: Employees (question 1)

Characteristics of the hospital (question 2)

This section describes the characteristics of the sample: the teaching status (teaching hospital, non-teaching hospital), the location (urban or rural hospital), and the type of institution (governmental, non-governmental, for profit)

Teaching status (question 2a)

Table 4.12 shows that 59 % of the respondents are working for non-teaching hospitals while only 40% for University or teaching hospitals.

Table 4.12: Teaching status (question 2a)

<i>Status</i>	<i>Frequency</i>	<i>Percent</i>
Teaching /University H	41	39.8
Non -teaching hospital	61	59.2
Total	102	99.0
Missing	1	1.0
Total	103	100.0

Location (question 2b)

According to the results in Table 4.13, 59% of the respondents are working in urban hospitals, while 39% are working in rural facilities. One respondent, who replied with a printed version of the questionnaire, marked both urban and rural settings (represented by the 1% other), adding as comment that his facilities are multisite.

Table 4.13: Location (question 2b)

	<i>Frequency</i>	<i>Percent</i>
Urban	61	59.2
Rural	40	38.8
Other	1	1.0
Total	102	99.0
Missing	1	1.0
Total	103	100.0

Type of institution (question 2c)

Most hospitals (56%) of the sample are non-governmental institutions, followed by 28% governmental organizations and 15% for profit hospitals (Table 4.14, Figure 4.3).

Table 4.14: Type of institution (question 2c)

	<i>Frequency</i>	<i>Percent</i>
Governmental	29	28.2
Non-governmental	58	56.3
For profit	15	14.6
Total	102	99.0
Missing	1	1.0
Total	103	100.0

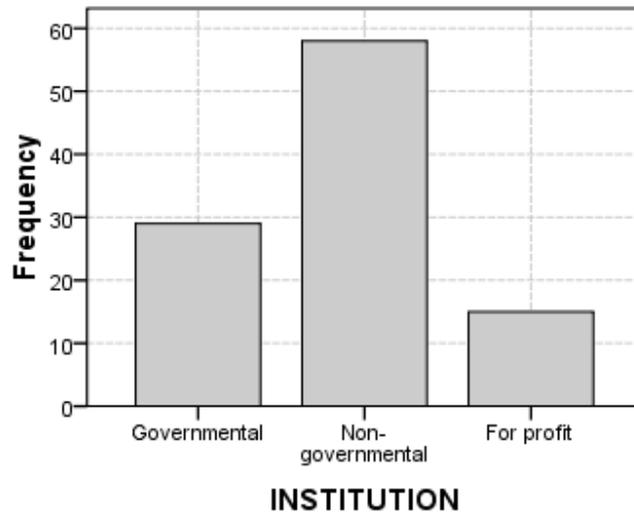


Figure 4.3: Type of institution (question 2c)

Table 4.14b shows the distribution of the three types of institutions according to countries. It is possible to notice that most governmental hospitals are located in the USA, in the UK and in Italy; most non-governmental hospitals are from the USA (46 out of 55); and also most for profit respondents are located in the USA. The only Austrian hospital is for profit, and 2 represent respectively Germany and Switzerland.

Table 4.14b: Type of institution according to country

	<i>Governmental</i>	<i>Non-governmental</i>	<i>For profit</i>
Austria	0	0	1
Germany	2	6	2
Italy	6	0	0
Switzerland	5	3	2
USA	7	46	10
UK	7	0	0
Total	27	55	15

Does the hospital offer, use or allow eLearning activities (question 3)

Most hospitals (77%) offer, use or allow eLearning activities, while 20% of the respondents do not (see Table 4.15).

Table 4.15: eLearning status (question 3)

	<i>Frequency</i>	<i>Percent</i>
yes	79	76.7
no	21	20.4
N/A	1	1.0
Total	101	98.1
Missing	2	1.9

Table 4.15b illustrates the acceptance of eLearning in the hospitals according to the participating countries. In the USA 54 out of 64 use this type of activity, while in the United Kingdom and in Italy all respondents answered positively to the acceptance. In Germany half of the hospitals accept eLearning while in Switzerland 6 out of 10 do not. Among the European countries, there are too few respondents to provide a fulfilling answer. Adding the results of the European participants the following can be found: 23 European hospitals accept eLearning, while 11 do not. In conclusion, eLearning is more spread in the USA with 84% of the hospitals using it, rather than in Europe with 68%.

Table 4.15b: eLearning status (question 3)

	<i>eLearning status</i>			<i>Total</i>
	<i>yes</i>	<i>no</i>	<i>n/a</i>	
USA	54	7	3	64
UK	7	0	0	7
Italy	6	0	0	6
Germany	5	5	0	10
Switzerland	4	6	0	10
Austria	1	0	0	1
N/A	2	3	0	5

Question 4: What type of eLearning activities does the hospital offer, use or allow.

Table 4.16 shows that the most frequently used eLearning media are online courses (65%), followed by the reading of online articles (62.1%), the use of digital media (like CD-ROMs or DVDs) (61.2%) and the possibility to participate to videoconferences (53.4%). Less common are the reading of emails about relevant material (41.7%), and the participation to discussion forums (28.2%).

Table 4.16: eLearning activities (question 4)

	<i>Frequency</i>	<i>Missing</i>	<i>Percent</i>
Online courses	67	36	65.0
Digital Media	63	40	61.2
Videoconferences	55	48	53.4
Forums	29	74	28.2
Online articles	64	39	62.1
Emails	43	60	41.7
Other	6	97	5.8

Figure 4.4 illustrates the distribution of the eLearning activities.

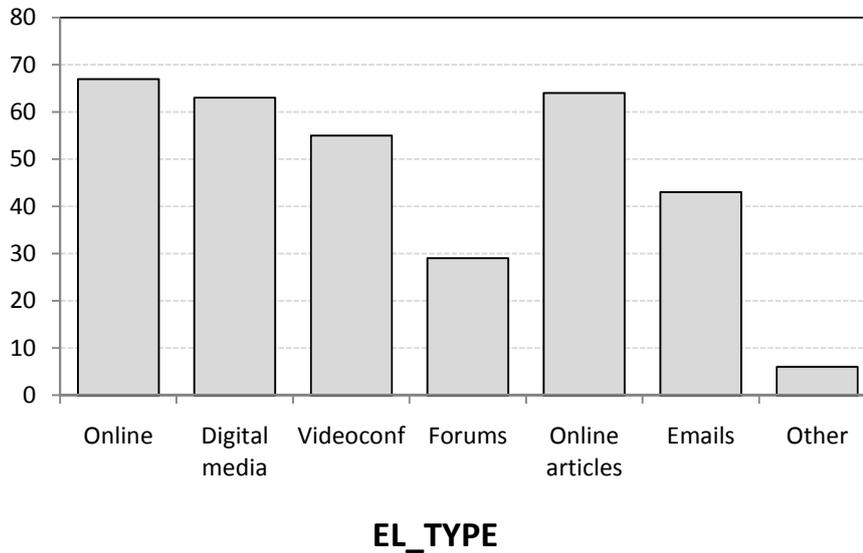


Figure 4.4: eLearning activities (question 4)

These results agree with the ones of question 11 in the pre-phase (see Appendix A.1), where online courses and the use of digital media were the most frequently accepted activities, followed by the reading of relevant online articles. In both surveys forums are the least common medium used as eLearning activity.

Several additional activities are mentioned (Table 4.17: question 4 - other): blended learning, programs and newsletters created by the hospital, intranet, point of care, webcasts and weekly internal conferences. Some comments on these options follow.

Blended learning: the respondent added an interesting point on the educational settings of the various activities. Online courses may in fact be organized in concurrence with other activities like in-presence classes. However, the focus of question 4 was on eLearning technologies; this answer can therefore not be considered as an additional option of eLearning type.

Programs and newsletters created by hospital: this answer already includes the reading of relevant articles or emails.

Intranet: the activities listed above can be organized in intranets, but an intranet itself is not always an eLearning tool.

Point of care: this answer is vague; the respondent did not leave his/her address in order to gather more information.

Webcasts: webcasts can be considered an additional eLearning content (like a text or a video) that can be considered to be part of the answer “CDs/DVDs and other digital media”.

Weekly internal conferences: if the conferences are held online, this activity can be considered a “videoconference”.

Table 4.17: Question 4 - other

	<i>Frequency</i>	<i>Percent</i>
Blended learning	1	1.0
Programs and newsletters created by hospital	1	1.0
Intranet	1	1.0
Point of care	1	1.0
Webcasts	1	1.0
Weekly internal conferences	1	1.0
No answer	97	94.2
Total	103	100.0

When eLearning activities started being offered, used or accepted (question 5)

A small percent of hospitals (4%) started offering, using or accepting eLearning activities in 1995 or earlier. Until 1999, 9% of the sample had implemented this type of activity. The number started growing after 2000: from 2000 until 2004 additional 42% of hospitals started using eLearning and from 2005 until 2006 another 21% decided to adopt digital learning. The main peaks can be observed in 2002 (12%) and in 2006 (13%), clearly visible in Table 4.18 and Figure 4.5. Finally, three respondents adopted this type of activity in 2007. Many respondents (25%) did not answer this question, also because question 3 asked to skip questions 4 and 5 in case the hospital was not offering eLearning.

Table 4.18: eLearning start (question 5)

<i>Year</i>	<i>Frequency</i>	<i>Percent</i>
1995 or before	4	3.9
1997	2	1.9
1998	1	1.0
1999	2	1.9
2000	7	6.8
2001	6	5.8
2002	12	11.7
2003	8	7.8
2004	10	9.7
2005	8	7.8
2006	13	12.6
2007	3	2.9
Total	76	73.8
Missing	27	26.2
Total	103	100.0

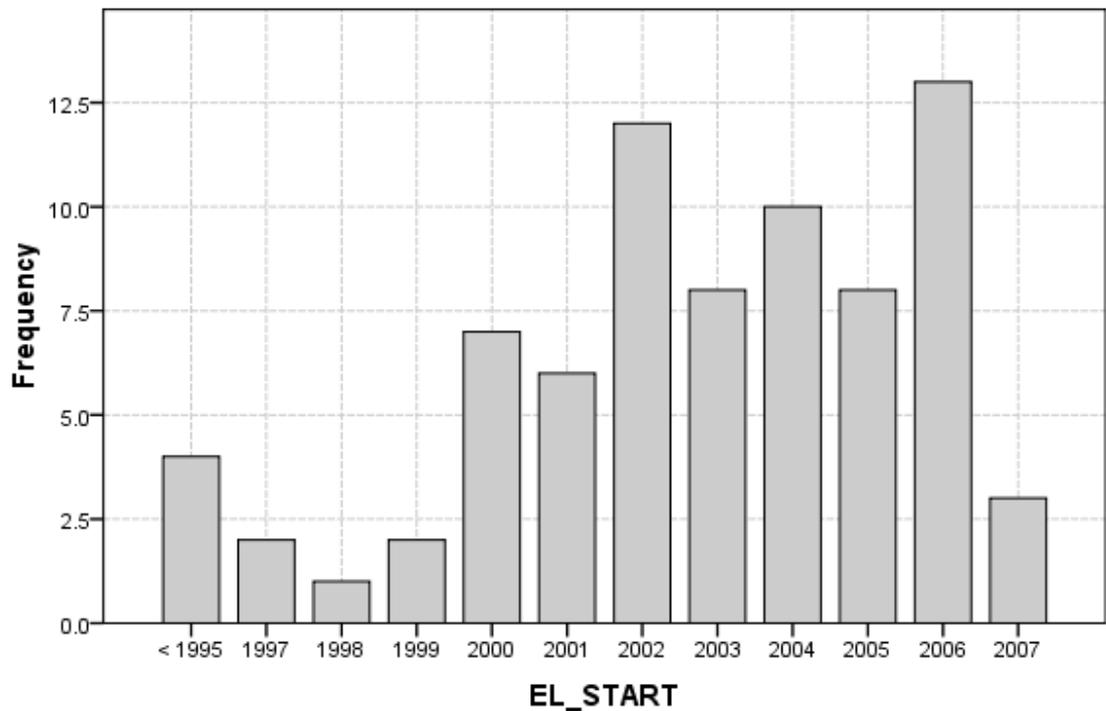


Figure 4.5: Start of eLearning activities (question 5)

The rapid growth of eLearning in hospitals can be explained with its general expansion in all fields during the last years.

Plans for introducing eLearning activities (question 6)

Among the hospitals that did not introduce eLearning activities yet, 3% are planning to do so in the next 2 years, while another 16% affirm not to have any plans yet (see Table 4.19 and Figure 4.6).

Table 4.19: Introduction of eLearning activities (question 6)

	<i>Frequency</i>	<i>Percent</i>
In 1 year	1	1.0
In 2 years	3	2.9
In 3 years	1	1.0
No plans	16	15.5
Total	21	20.4
Missing	82	79.6
Total	103	100.0

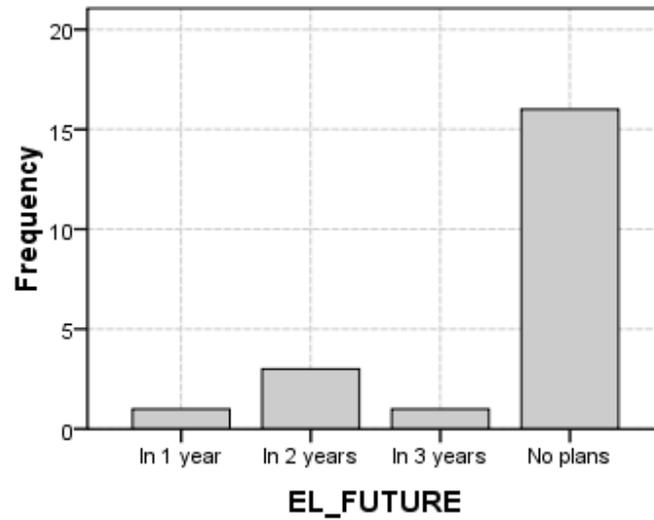


Figure 4.6: Introduction of eLearning activities (question 6)

Role of the respondent (question 8)

Most respondents were CME managers of the hospitals (49.5%), followed by eLearning designers (6.8%), CLOs (5.8%) and Educators (5.8%). The results are presented in Table 4.20. The presentation letter sent together with the questionnaire specifically asked the participation of CME managers, this influenced the participation of the latter.

Table 4.20: Role (question 8)

<i>Role</i>	<i>Frequency</i>	<i>Percent</i>
Administrator	1	1.0
CEO	1	1.0
Chief Information Officer	1	1.0
Clinical Skills facilitator	1	1.0
CLO	6	5.8
CME Manager	51	49.5
Course Developer	1	1.0
Director	2	1.9
Educator	6	5.8
eLearning designer	7	6.8
FOI Coordinator	1	1.0
Human Resources	2	1.9
Instructional Technologist	2	1.9
IT manager	1	1.0
IT Trainer	1	1.0
Librarian	2	1.9
Nurse	2	1.9
Operations Director	1	1.0
Physician	2	1.9
Quality Manager	3	2.9
Senior Learning Consultant	1	1.0
N/A	8	7.8
Total	103	100.0

Profession (question 9)

This question revealed that most participants were nurses (32%), followed by physicians (12.6%). The remaining answers were not grouped due to lack of additional information. Most answers were not precise enough to be grouped into any category (e.g. master, technician, non clinical, etc.). Additionally, question 9 was often confused with question 8. Due to these complications this question was not further analyzed. The results are represented in Table 4.21.

Table 4.21: Professional background (question 9)

<i>Profession</i>	<i>Frequency</i>	<i>Percent</i>
Administration	2	1.9
Bachelor	2	1.9
Biomedical Laboratory Tec.	1	1.0
Business	1	1.0
Clerical	1	1.0
CME Manager	2	1.9
Communication	1	1.0
Economy	3	2.9
Education	9	8.7
Employee	1	1.0
Health Information Mgement	1	1.0
Human Resources	2	1.9
IT Training	1	1.0
Journalism and PR	1	1.0
Lawyer	1	1.0
Management	2	1.9
Marketing	1	1.0
Master	1	1.0
MBA	1	1.0
Medical Librarian	2	1.9
Medical meeting planner	1	1.0
N/A	11	10.4
Non clinical	1	1.0
Nurse	33	32.0
Paramedic	1	1.0
Pedagogy	1	1.0
Physician	13	12.6
Psychology	1	1.0
Psychotherapist	1	1.0
Public Health	1	1.0
Sports Medicine Trainer and Teacher	1	1.0
Technician	1	1.0
Therapist	1	1.0
Total	<i>103</i>	<i>100.0</i>

Actions carried out by the hospitals (question 7 a)

Table 4.22 shows (ordered by frequency) the actions carried out by the CME managers in the hospitals to inform learners about ongoing eLearning activities. The Table points out that when a CME manager informs healthcare professionals about an eLearning event, the three actions that are mostly carried out are “inform about the voluntariness of the activity”, “use of internal communication channels to inform about eLearning activities” and “identify the educational needs of the eLearners”. The least used are “setting guidelines on a correct environment for eLearning activities”, “create incentives for eLearning results”, and “Emphasize possibility to be part of a community of practice”.

The Table also contains the ranking of the parameters according to the study on eLearning readiness for companies (see Appendix A.6). It is possible to notice that the voluntariness occupies position 6 in the mentioned index, the communication behavior takes position 3, and the needs are not listed. The next point presents the importance of the actions according to the CME managers introducing the eLearning Readiness Index for CME. Comparisons to the corporate sector and to the importance of the actions are presented from section 4.4.4 on. Further comments and conclusions can be found in Chapter 5.

Table 4.22: Actions carried out (question 7a)

<i>ACTION</i>	<i>DESCRIPTION</i>	<i>eCME rank</i>	<i>Corp rank</i>	<i>YES</i>	<i>NO</i>	<i>YES (%)</i>	<i>NO (%)</i>	<i>Valid</i>	<i>Miss</i>
Voluntariness	Inform about the voluntariness of the activity	1	6	74	26	71.8	25.2	100	3
Communication Behaviour	Use of internal communication channels to inform about eLearning activities	2	3	73	27	70.9	26.2	100	3
Needs	Identify the educational needs of the eLearners	3	N/A	69	30	67	29.1	99	4
Support	Provide technical and content support during the activity	4	4	68	31	66	30.1	99	4
Preparation	Specify details of the activity (start, contents, objectives, etc)	5	2	68	32	66	31.1	100	3
Time	Set time restrictions	6	10	64	36	62.1	35	100	3
Corporate Motivation	Management support	7	5	62	38	60.2	36.9	100	3
Culture	Line up eLearning activities with other training activities	8	8	62	38	60.2	36.9	100	3
Institutional Commitment	Specify the hospital's / company's goals	9	9	61	39	59.2	37.9	100	3
List	Provide a list of courses with detailed description	10	N/A	57	42	55.3	40.8	99	4
Perceived Usefulness	Underline relevance between eL activity and the job	11	7	56	47	54.4	45.6	103	0
Goal Commitment	Specify the expected changes in the professional practice	12	1	56	44	54.4	42.7	100	3
Credits	Specify the nr. of credits	13	N/A	55	42	53.4	40.8	97	6
Perceived Relative Advantage	Clarify possible advantages of eLearning activities	14	11	52	47	50.5	45.6	99	4
Diploma	Giving a formal diploma to the participants	15	N/A	52	48	50.5	46.6	100	3
Training	Train learners to gain skills to attend eLearning activities	16	12	40	60	38.8	58.3	100	3
Peer Communication	Involve persons who like eL	17	16	36	64	35	62.1	100	3
Perceived Observability	Give the opportunity to try eL technologies	18	13	34	66	33	64.1	100	3
Experience and Expectations	Analyze learners' experience and expectations of eLearning	19	14	32	78	31.1	66	100	3
Place	Set guidelines on a correct environment for eL activities	20	17	29	71	28.2	68.9	100	3
Incentives	Create incentives for eL results	21	15	24	76	23.3	73.8	100	3
Community	Emphasize possibility to be part of a community of practice	22	N/A	17	83	16.5	80.6	100	3

Importance of the actions (question 7 b)

The following section analyzes the importance of the 22 eLearning actions previously presented, showing in graphs the importance of the single actions, in a scale from 1 to 5, where 1= not at all important, 2 = slightly important, 3 = moderately important, 4 = quite important, and 5 = extremely important.

ACTION 1: *Underline the relevance between the eLearning activity and the learner's specialty or activity in the job.* Figure 4.7 shows that most respondents perceived this action as “slightly important” (35.6%), 31.7% as “moderately important” and 19.8% as “not at all important”. In total only about 13% indicated it as “quite” and “extremely” important.

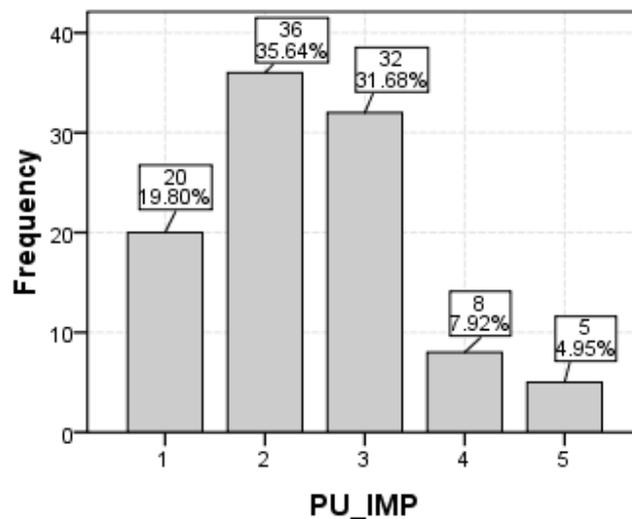


Figure 4.7: Importance of Perceived Usefulness (question 7b)

ACTION 2: Encourage *managers in supporting and getting involved in eLearning activities*. Also for this action Figure 4.8 shows that most respondents selected “slightly important” (43.4%), while 25.3% chose “not at all important” and 21.2% “moderately important”. In total only 10% perceived it as “quite” and “extremely” important.

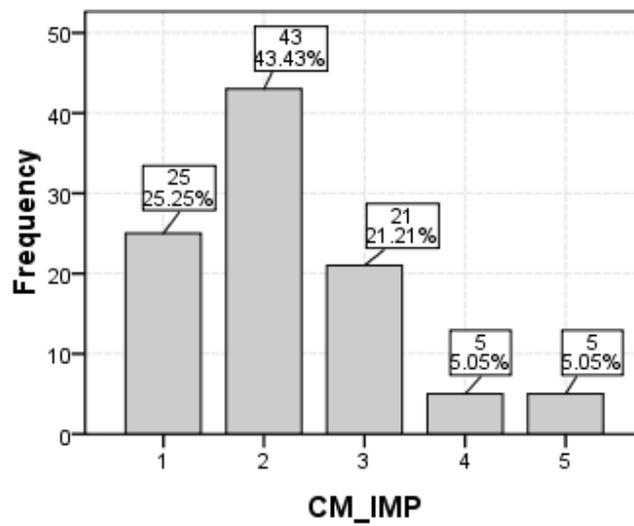


Figure 4.8: Importance of Corporate Motivation (question 7b)

ACTION 3: *Provide technical and content support during the eLearning activity.* 39% of the respondents indicated the action as “slightly important”, 29% as “not at all important”, and 22% as moderately important. Also in this case only 10% identified it as “quite” and “extremely” important. In Figure 4.9 it is possible to notice that the tendency is towards a low importance of action 3.

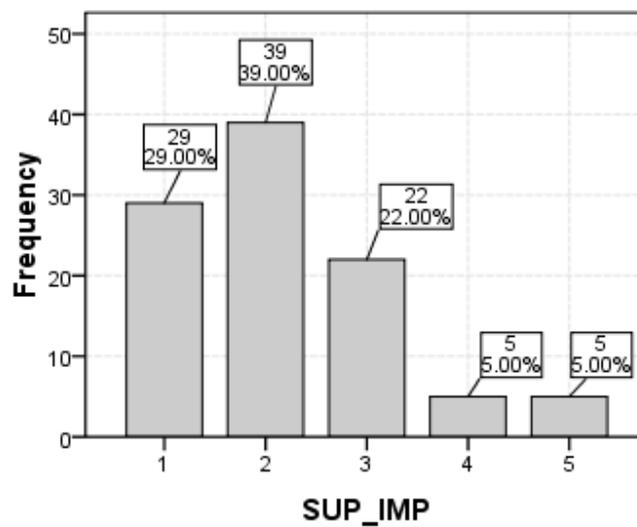


Figure 4.9: Importance of Support (question 7b)

ACTION 4: *Specify the expected changes in the professional practice.* The three first categories were all chosen at around 30%, most participants perceived this action as “moderately important” (34%), followed by 33% “slightly important” and 28% “not at all important”. It is possible to notice the small percent of “quite” and “extremely important”, which reaches 5% (see Figure 4.10).

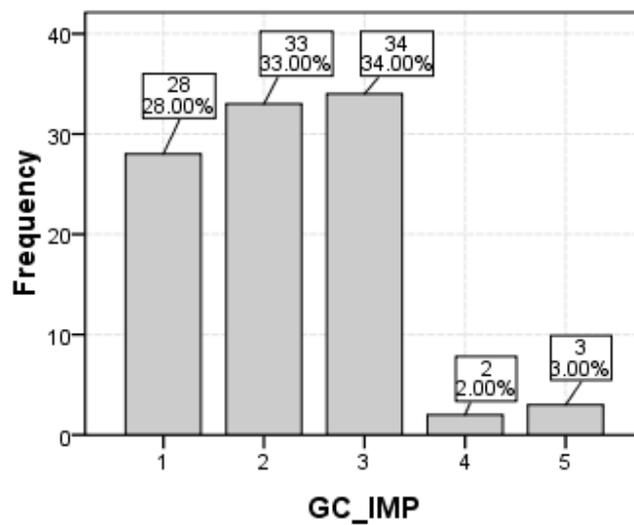


Figure 4.10: Importance of Goal Commitment (question 7b)

ACTION 5: *Specify the details of the eLearning activity (starting/due date, contents, objectives, requirements, assignments, evaluation procedures, etc.).* Also the results of this action can be similarly described, 94% of the respondents did not consider it more than moderately important, while 6% opted for higher scores. This action was considered one of the least important ones (20th position out of 22). Additional details can be observed in Figure 4.11.

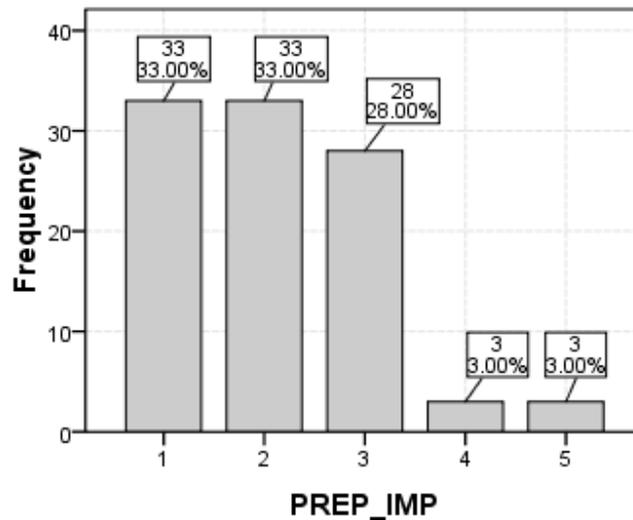


Figure 4.11: Importance of Preparation (question 7b)

ACTION 6: *Set specific time restrictions/deadlines for the eLearning activity.* Exactly the same results can be observed like for action 5 (see Figure 4.12).

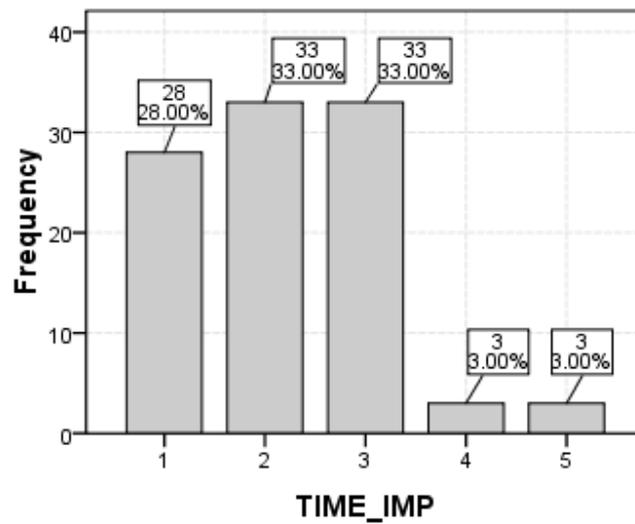


Figure 4.12: Importance of Time restrictions (question 7b)

ACTION 7: *Specify the goals the hospital wants to achieve by proposing the eLearning activity.* Figure 4.13 illustrates that most (92%) of the answers do not consider this action important, while 8% gave more positive grades.

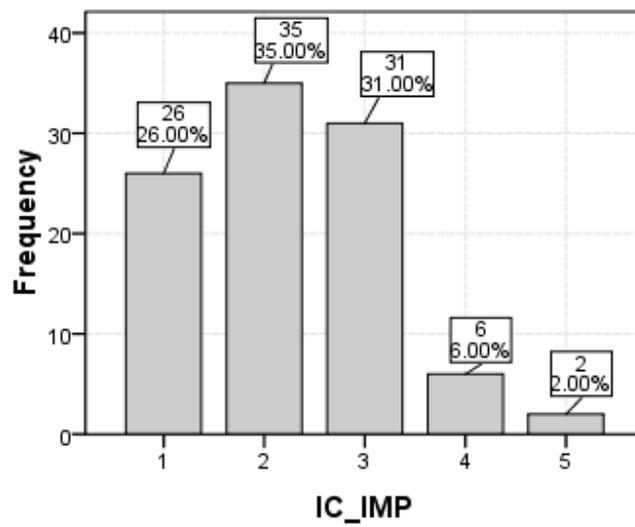


Figure 4.13: Importance of Institutional Commitment (question 7b)

ACTION 8: *Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices.* Most respondents indicate this action as “slightly important” (39%), 30% identified it as “moderately important” and 23.2% as “not at all important” (Figure 4.14). A small percent selected it as “quite” or “extremely important” (7%).

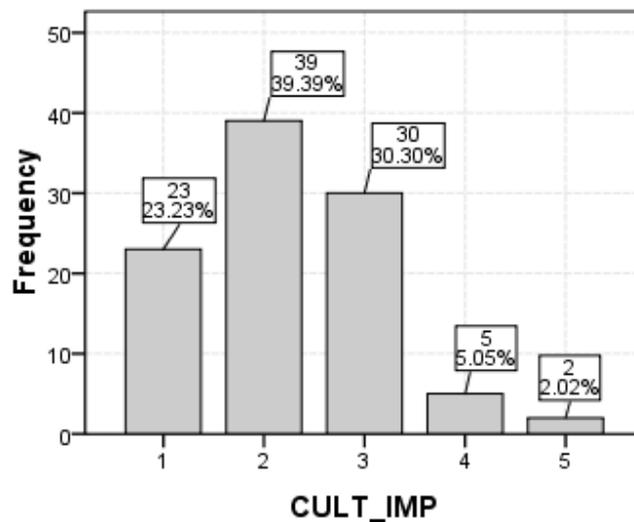


Figure 4.14: Importance of Culture (question 7b)

ACTION 9: Use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, etc.). Also for this action most participants selected the importance as “slight” (38.4%). In fact 95% perceived it as moderate, slight or not important. Only 5% indicated it as quite or extremely important. Figure 4.15 shows the frequency and percent for each category. This action was perceived as one of the least important ones (19th position out of 22).

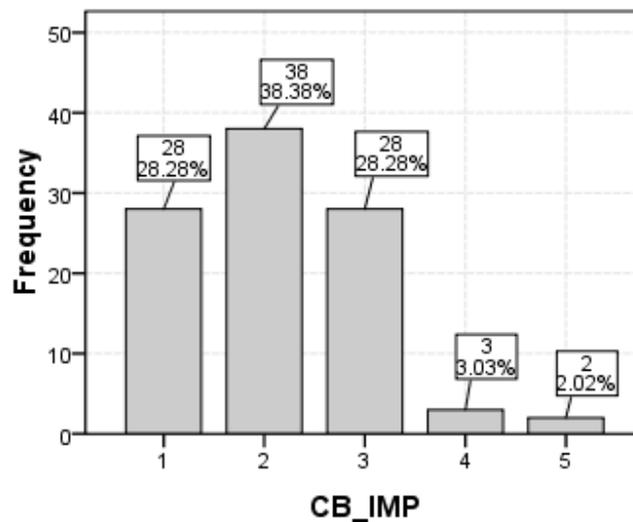


Figure 4.15: Importance of Communication Behavior (question 7b)

ACTION 10: *Specify a target audience and/or the degree to which the activity is compulsory or voluntary.* This action was indicated as one of the least important (21st position out of 22) with only 1% perceiving it as “quite important” and 2% as extremely important. Most respondents selected the answer “slightly important” (37%), followed by “not at all important” (34%), the results can be observed in Figure 4.16.

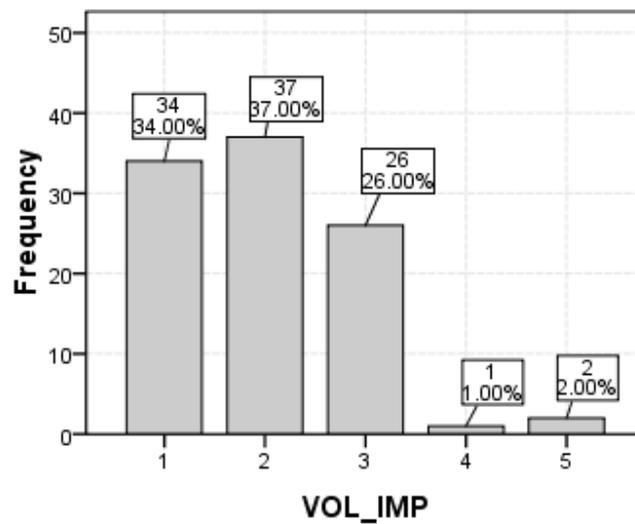


Figure 4.16: Importance of Voluntariness (question 7b)

ACTION 11: *Identify persons who like eLearning activities and positively talk about them to their peers, and involve them in the process.* The majority of the respondents selected this action as “moderately important” (39%), 46% chose either “not at all” or “slightly important”, 8% indicated it as “quite important” and 7% as extremely important. The data is represented in Figure 4.17.

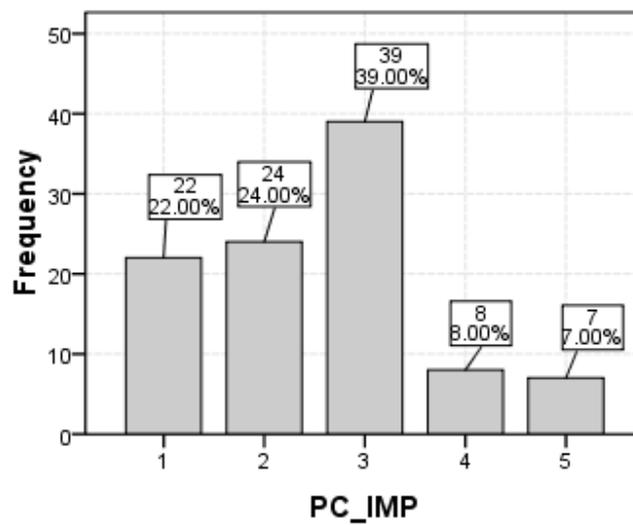


Figure 4.17: Importance of Peer Communication (question 7b)

ACTION 12: *Prepare/train eLearners about relevant skills needed in order to successfully attend an eLearning experience (e.g.: time management, self-directed learning, etc.).* Also for this action most respondents selected “moderately important” (44%), while 22.5% perceived it as “slightly important” and 21.4% as “not at all important”. The data is represented in Figure 4.18.

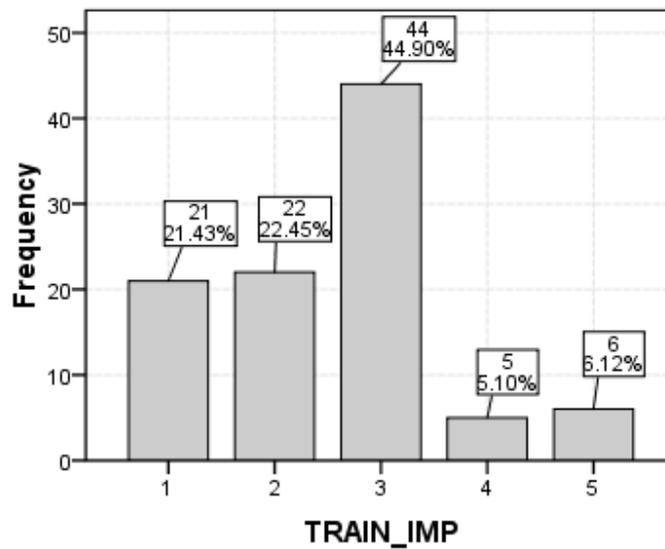


Figure 4.18: Importance of Training the participants (question 7b)

ACTION 13: *Clarify the possible advantage(s) of eLearning (compared to other training solutions)*. The majority of the respondents (46%) indicated this action as “moderately important”. The data is represented in Figure 4.19.

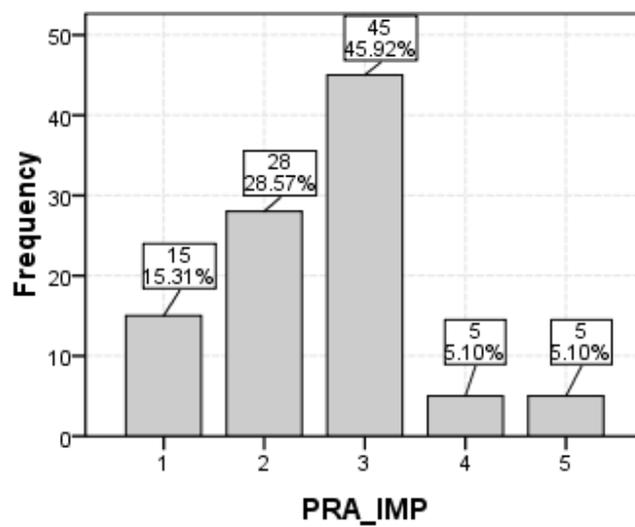


Figure 4.19: Importance of Perceived Relative Advantage (question 7b)

ACTION 14: *Create incentives and/or a recognition system for eLearning results (other than CME credits)*. This action was considered among the most important ones (2nd position out of 22). Most respondents indicated this action as “moderately important” (50%), 22% as “slightly important”, 12% as “quite important”, 8% as “not at all important and 8% as “extremely important”. In total 20% perceived this action as “quite” or “extremely important” and 30% as “not at all” or “slightly important”. The data described in this point is illustrated in Figure 4.20.

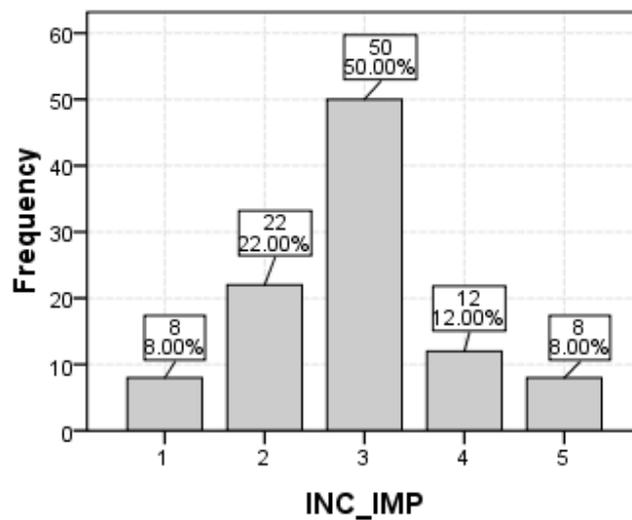


Figure 4.20: Importance of creating incentives (question 7b)

ACTION 15: *Analyze eLearners' expectations and/or their previous experiences with eLearning.* Most respondents perceived this action as “moderately important” (41.2%) or as “slightly important” (36%). In Figure 4.21 it is possible to notice the concentration in these two areas.

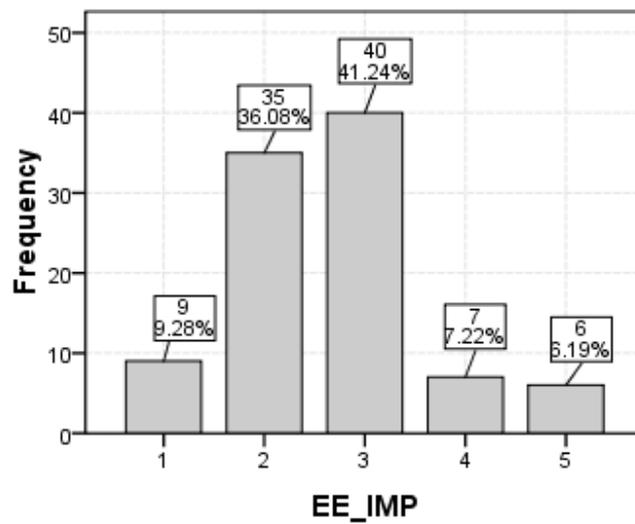


Figure 4.21: Importance of Experience and Expectations (question 7b)

ACTION 16: *Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.* The majority selected as answer “moderately important” (40.8%), 16.3% considered it “quite” or “extremely important” and 13.3% did not consider it important at all. This positions the action at the 4th position out of 22. Figure 4.22 illustrates the collected data for this action.

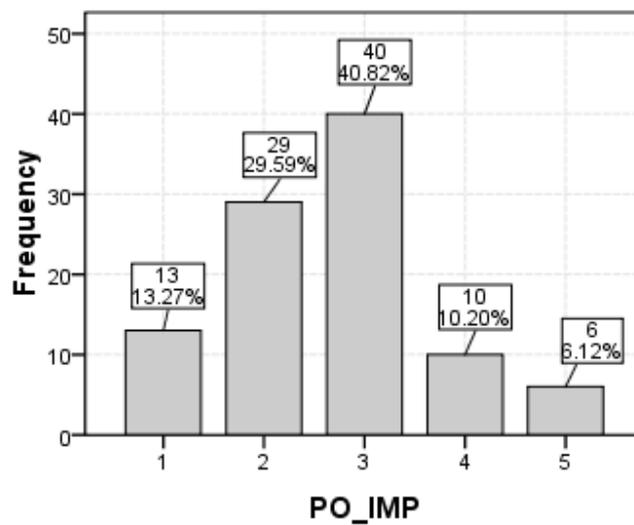


Figure 4.22: Importance of Perceived Observability (question 7b)

ACTION 17: *Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).* This action was perceived as important; the answers led it to the 3rd position out of 22. Like in the previous cases most respondents indicated it as “moderately important”, 24.7% as “slightly important”, 13.4% as “not at all important”, 9.3% as “quite important” and 6.2% as “extremely important”. Figure 4.23 illustrates the above described data.

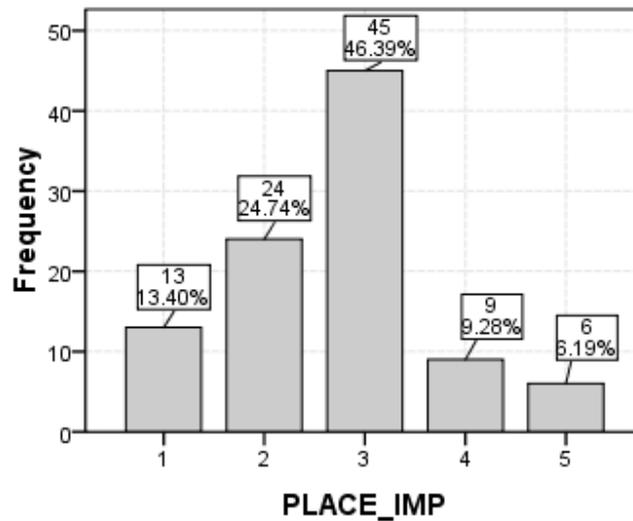


Figure 4.23: Importance of Place guidelines (question 7b)

ACTION 18: *Specify how many CME credits/points the activity will be worth.*

Most respondents (34.7%) identified this action as “not at all important” (Figure 4.24), which differs from the previously described actions. Furthermore, 30.53% indicated it as “moderately important” and 23.16% as “slightly important”.

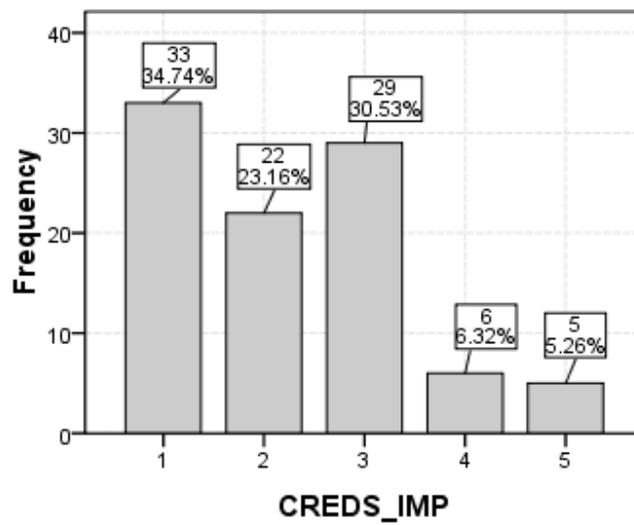


Figure 4.24: Importance of specifying the number of CME credits

ACTION 19: *Emphasize the possibility of being part of an online community of practice.* This action was perceived as the most important among all. Also in this case most respondents (60.6%) indicated it as “moderately important”, 14.9% as “slightly important”, 9.6% as “quite important”, 7.5% as “not at all important” and finally 7.5% as “extremely important”. In total 17% find this action either “quite” or “extremely important” (see Figure 4.25).

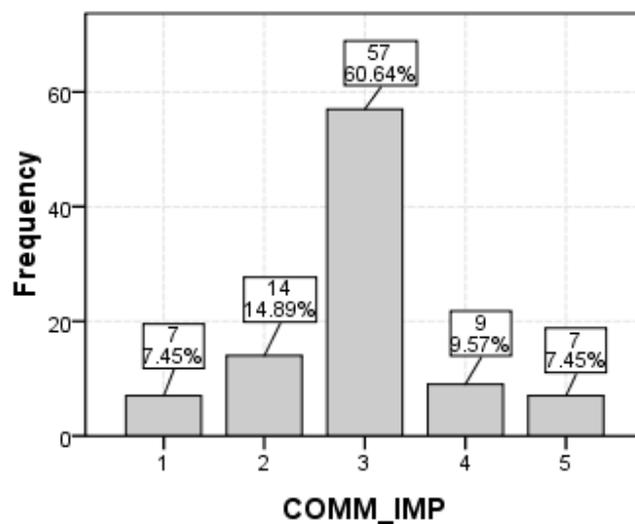


Figure 4.25: Importance of Community of practice (question 7b)

ACTION 20: Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits. Most respondents identified this action as “slightly important” (34.7%), 27.4% as not important at all, and 27.4% as “moderately important”. Figure 4.26 shows the preference for the answer “slightly important”.

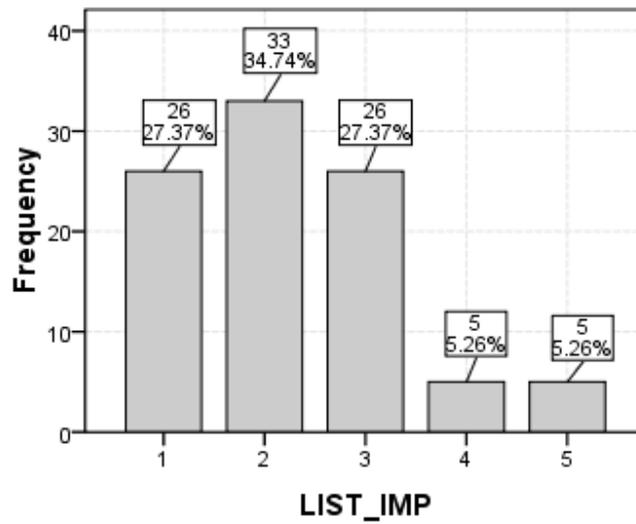


Figure 4.26: Importance of List of courses (question 7b)

ACTION 21: *Identify educational needs the healthcare professionals might have.* This action was perceived as the least important of all with 48% of answers indicating it as “not at all important”, followed by 23.5% “slightly important” and 22.5% “moderately important”. Figure 4.27 clearly shows the preference for the first answer: “not at all important”.

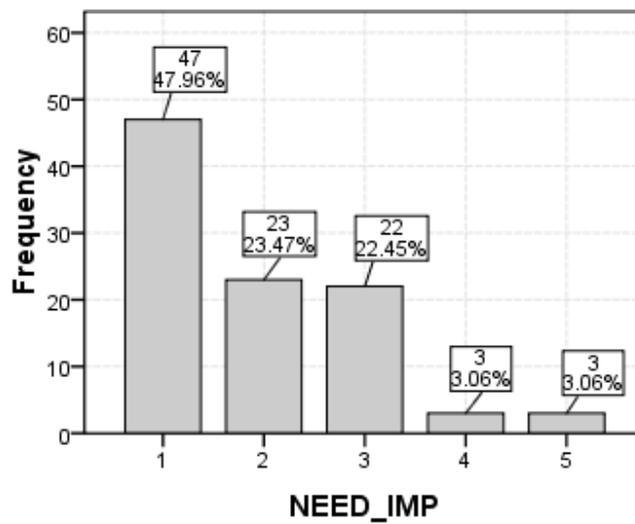


Figure 4.27: Importance of Identify Needs (question 7b)

ACTION 22: *Giving a formal diploma (or similar) to participants*. The majority of the respondents (38.8%) indicated this action as “moderately important”, 27.6% as “slightly important” and 20.4% as “not at all important” (see Figure 4.28).

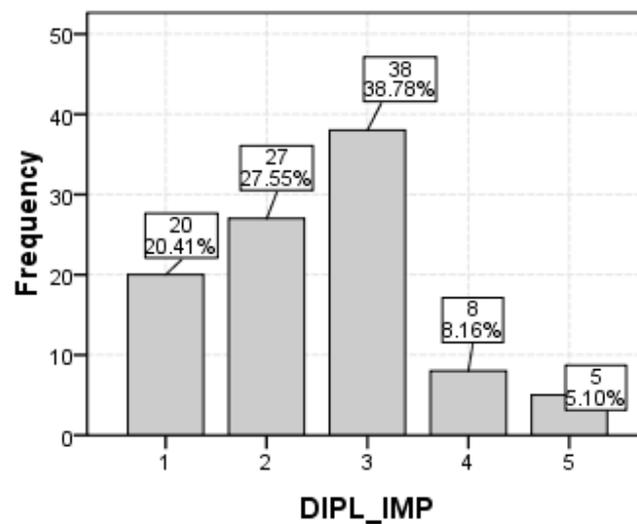


Figure 4.28: Importance of providing a diploma (question 7b)

Importance of the actions ordered by mean: the eCME Readiness Index (eCMERI)

Ordered by mean (see Table 4.23: eCMERI), the most important identified actions are:

- 1) To inform the participants about the possibility to be part of a *community of practice*,
- 2) To create *incentives* and/or recognition system for eLearning results (other than CME credits).
- 3) To set guidelines to create the correct *environment* where the eLearning activity should take place.

The first action (community of practice) is not present in CeLeRI (Succi and Cantoni, 2008), the second (creating incentives) is at position 14, and the third (place guidelines) at position 17 of the mentioned list. The rankings of CeLeRI are observable in Appendix A.7. Most actions that are considered important in the hospital sector found low ranks in the corporate sector. In fact, the elements of eCMERI are almost inverted to the ones of CeLeRI. This verifies *hypothesis 1* “The eLearning Readiness Index (Succi and Cantoni, 2008) cannot be equally applied to different sectors; in particular differences are expected in the healthcare setting”. Further analysis is carried out in section 4.4.8, and comments on the positioning of the actions can be found in section 4.5 where CeLeRI, eCMERI and their respective carried out actions are confronted and illustrated (Table 4.43: Action and importance ranks).

The lowest mean value in eCMERI is 1.90, while the highest is 2.95. The variable with the smallest standard deviation is the *importance of voluntariness* (see Table 4.24: Importance of the actions, ordered by standard deviation), which shows that the opinions on the importance of specifying the voluntariness of an activity are the most similar. The next two variables with a small standard deviation are: the *importance of a community of practice* and the *importance of the communication behavior* (use of internal communication channels).

The above listed graphs (Figure 4.7 - Figure 4.28) clearly show that the distributions are not normal; the results of the Kolmogorov-Smirnov test on all variables (0 in all cases) confirm this observation (a distribution is normal when the value is over 0.5). The standard deviations (from 1.05 - 0.92) are rather large relative to the means (which go from 2.95 - 1.90), indicating that the means do not precisely represent the data. The following sections present comparisons between the corporate and the hospital sectors: correlations, categorical data analysis, cluster analysis, factor analysis and t-tests are carried out. The final section of the Chapter recapitulates all the indexes (the actions carried out in the two sectors, CeLeRI and eCMERI), offering a thorough interpretation.

Table 4.23: eCME readiness Index (eCMERI) Importance of the actions, ordered by mean

<i>Importance of:</i>	<i>eCMERI</i>	<i>CeLeRI</i>	<i>N</i>	<i>Range</i>	<i>Min</i>	<i>Max</i>	<i>Sum</i>	<i>Mean</i>	<i>Std. Dev.</i>
Community of practice	1	N/A	94	4	1	5	277	2.95	0.92
Creating incentives	2	14	100	4	1	5	290	2.90	0.99
Place guidelines	3	17	98	5	1	6	268	2.73	1.07
Opportunity to try tools (Perceived Observability)	4	16	98	4	1	5	261	2.66	1.04
Analyzing expectations (Experience & Expectations)	5	15	97	4	1	5	257	2.65	0.97
Clarifying advantages (Perceived Relative Advantage)	6	13	98	4	1	5	251	2.56	0.99
Involving persons who like eL (Peer Communication)	7	11	100	4	1	5	254	2.54	1.13
Training the participants	8	12	98	4	1	5	247	2.52	1.08
Providing a diploma	9	N/A	98	4	1	5	245	2.50	1.07
Explaining relevance between eL activity and job (Perceived Usefulness)	10	1	101	4	1	5	245	2.43	1.05
Providing a list of courses	11	N/A	95	4	1	5	215	2.26	1.08
Specifying nr. of CME credits	12	N/A	95	4	1	5	213	2.24	1.16
Lining up eL with other activities (Culture)	13	7	99	4	1	5	221	2.23	0.94
Explaining the goals of the hospital (Institutional Commitment)	14	6	100	4	1	5	223	2.23	0.97
Management support (Corporate Motivation)	15	2	99	4	1	5	219	2.21	1.04
Time restrictions	16	10	100	4	1	5	220	2.20	0.99
Explaining the expected changes in the profession (Goal Commitment)	17	4	100	4	1	5	219	2.19	0.97
Technical and content support	18	3	100	4	1	5	218	2.18	1.07
Use of internal communication channels (Communication Behaviour)	19	8	99	4	1	5	210	2.12	0.93
Specifying eL activity details (Preparation)	20	5	100	4	1	5	210	2.10	1.00
Compulsory vs. voluntary	21	9	100	4	1	5	200	2.00	0.91
Identifying needs	22	N/A	98	4	1	5	186	1.90	1.05

Table 4.24: Importance of the actions, ordered by standard deviation

<i>Importance of:</i>	<i>eCMERI</i>	<i>CeLeRI</i>	<i>N</i>	<i>Range</i>	<i>Min</i>	<i>Max</i>	<i>Sum</i>	<i>Mean</i>	<i>Std. Dev.</i>
Compulsory vs. voluntary	21	9	100	4	1	5	200	2	0.91
Community of practice	1	N/A	94	4	1	5	277	2.95	0.92
Use of internal communication channels (Communication Behaviour)	19	8	99	4	1	5	210	2.12	0.93
Lining up eL with other activities (Culture)	13	7	99	4	1	5	221	2.23	0.94
Analyzing expectations (Experience & Expectations)	5	15	97	4	1	5	257	2.65	0.97
Explaining the expected changes in the profession (Goal Commitment)	17	4	100	4	1	5	219	2.19	0.971
Explaining the goals of the hospital (Institutional Commitment)	14	6	100	4	1	5	223	2.23	0.97
Clarifying advantages (Perceived Relative Advantage)	6	13	98	4	1	5	251	2.56	0.99
Time restrictions	16	10	100	4	1	5	220	2.2	0.99
Creating incentives	2	14	100	4	1	5	290	2.9	0.99
Specifying eL activity details (Preparation)	20	5	100	4	1	5	210	2.1	1
Opportunity to try tools (Perceived Observability)	4	16	98	4	1	5	261	2.66	1.04
Management support (Corporate Motivation)	15	2	99	4	1	5	219	2.21	1.04
Identifying needs	22	N/A	98	4	1	5	186	1.9	1.05
Explaining relevance between eL activity and job (Perceived Usefulness)	10	1	101	4	1	5	245	2.43	1.05
Providing a diploma	9	N/A	98	4	1	5	245	2.5	1.07
Technical and content support	18	3	100	4	1	5	218	2.18	1.07
Place guidelines	3	17	98	5	1	6	268	2.73	1.07
Training the participants	8	12	98	4	1	5	247	2.52	1.08
Providing a list of courses	11	N/A	95	4	1	5	215	2.26	1.08
Involving persons who like eL (Peer Communication)	7	11	100	4	1	5	254	2.54	1.13
Specifying nr. of CME credits	12	N/A	95	4	1	5	213	2.24	1.16

4.4.4 Correlations

Correlations were estimated between the carried out actions and the CME status (mandatory vs. semi-mandatory) of the countries. Furthermore correlations were carried out with the number of employees of the hospitals, the teaching status (teaching vs. non-teaching hospitals), the location (urban vs. rural hospitals), the type of institution (governmental, non-governmental, for profit hospitals), the eLearning status (is eLearning used or not?) and the year eLearning was introduced in the hospitals. No significant correlations were found. The following section presents the results of the categorical analysis.

4.4.5 Categorical data analysis

In the following sections, categorical data analysis was carried out. Contingency tables were used to analyze the relationship between the variables (Fienberg, 2000). Relations were identified with Pearson's chi-square test calculated with SPSS (values lower than 0.05 were considered).

Associations according to size of the hospitals

In order to calculate the association between the number of employees and other variables, large hospitals (with 5001-10000 and 10001-15000 workers) are grouped due to the small amount of representatives. Finally, four groups are formed: small sized (1-500 employees), small-medium size (501-1000 employees), medium-large (1001-5000 employees) and large hospitals (> 5001 employees).

The number of employees influences the answers of 8 out of 22 actions (Table 4.25 - Employees). In hospitals with more than 1000 healthcare professionals most actions listed in Table 4.22 (Actions carried out) are carried out, while in hospitals with less than 1000 employees the actions carried out versus the ones not carried out are rather even. The variables indicate that in large hospitals the criteria informing eLearners about the

advantages in participating to the event (perceived usefulness, specification of the number of credits and possibility to receive a diploma) and the criteria indicating how the event is being organized (corporate motivation, preparation, time restrictions, experience and expectations) are mainly carried out.

Table 4.25: Employees

	Chi-Square	Probability	Employees							
			1-500		501 - 1000		1001 - 5000		> 5001	
			yes	no	yes	no	yes	no	yes	no
Perceived Usefulness	15.88	0.001	14	27	10	11	23	6	8	3
Corporate Motivation	8.23	0.041	19	21	12	8	21	8	9	1
Preparation	13.15	0.004	21	8	11	9	24	5	11	0
Time	7.87	0.048	20	19	11	9	23	6	9	2
Voluntariness	10.78	0.012	23	16	14	6	25	4	22	0
Experience Expectations	9.91	0.019	10	29	5	15	8	21	8	3
Credits	12.36	0.005	20	18	6	14	18	9	10	1
Diploma	15.2	0.001	15	24	7	13	20	9	10	1

Association between the teaching status and actions

In Table 4.26 it is possible to notice that few teaching hospitals give directions on the correct environment where the eLearning activities should take place. This is expected, since it is likely that teaching hospitals have computers available to the personnel, or possibly even a computer room.

Table 4.26: Teaching status

	Chi-Square	Probability	<i>Teaching status</i>			
			Teaching hospital		Non-teaching H	
			yes	no	yes	no
Place	5.05	0.027	7	34	22	36

Association between location and actions

No association can be noticed between the location of the hospitals (rural – urban) and the actions.

Associations between type of institution and actions

In Table 4.27 several associations can be noticed between the type of institutions and the following variables: support, communication behavior, voluntariness, and perceived observability. Most governmental institutions carry out these actions, with the exception of the perceived observability which is more evenly distributed. Non governmental institutions answered in a similar way, while for-profit hospitals tend not to carry out the above mentioned actions. An additional observation is that only one for-profit hospital carries out the perceived observability. A possible conclusion is that in non-profit hospitals there is a higher need to inform eLearners about the technological and content support given during and before the event (support, perceived observability), and about the voluntariness or obligation to participate. Internal marketing channels are vastly used to promote the activities (communication behavior).

Table 4.27: Type of institution

	Chi-Square	Probability	Institution					
			Gov.		Non gov		For profit	
			yes	no	yes	no	yes	no
Support	8.07	0.017	22	5	40	16	6	9
Communication Behavior	9.82	0.007	23	5	43	13	6	9
Voluntariness	9.4	0.008	25	3	42	14	7	8
Perceived Observability	6.96	0.030	13	15	20	35	1	14

Association between usage of eLearning in hospitals and actions

Easily predictable, in the following Table (4.28) it is possible to observe how hospitals that accept eLearning are more likely to carry out actions to promote eLearning activities. The only exception is the community of practice, which is evenly carried out by both settings. This might indicate that also in hospitals where eLearning is not accepted healthcare

professionals are encouraged to participate to online communities of practice. An additional possible conclusion is that there is a tendency to accept eLearning in future.

Table 4.28: eLearning status

	Chi-Square	Probability	<i>eLearning status</i>			
			accepted		not accepted	
			yes	no	yes	no
Perceived Usefulness	34.15	0	56	24	0	21
Corporate Motivation	40.46	0	60	18	0	20
Support	42.42	0	66	13	1	17
Goal Commitment	20.33	0	54	26	2	16
Preparation	40.91	0	66	14	1	17
Time	33.83	0	62	18	1	17
Institutional Commitment	30.18	0	59	21	1	17
Culture	30.88	0	60	20	1	17
Communication Behavior	44.64	0	70	10	2	16
Voluntariness	52.88	0	71	9	1	17
Peer Communication	10.44	0.002	34	46	1	17
Training	12.23	0.001	38	42	1	17
Perceived Relative Advantage	18.94	0	50	30	1	16
Incentives	7.52	0.017	24	56	0	18
Experience & Expectations	7.88	0.015	31	49	1	17
Perceived Observability	9.66	0.003	32	48	1	17
Place	8.08	0.008	27	53	1	17
Credits	26.22	0	54	23	1	17
List	27.12	0	56	23	1	17
Needs	44.62	0	67	12	1	17
Diploma	21.07	0	51	29	1	17

Associations according to the start of eLearning in the hospital

In order to calculate the association between the year eLearning took first place in the hospital and other variables, several years selectable in the questionnaire needed to be grouped because of the small amount of available answers: 1995 or earlier until 1999 represent the first group, 2006 and 2007 represent the last group (see Table 4.29). Several actions are almost always carried out by hospitals where eLearning was introduced before 1999 (goal commitment, perceived observability). The goal commitment is carried out in most cases by hospitals that introduced eLearning in 2000, 2001, 2003 and 2006 or later.

The perceived observability on the other hand is mostly not carried out by hospitals that introduced eLearning in 2000, 2001, 2005, and 2006 or later.

Table 4.29: eLearning start

	Chi-Square	Prob.	<i>eLearning start</i>															
			>1999		2000		2001		2002		2003		2004		2005		>2006	
			y	n	y	n	y	n	y	n	y	n	y	n	y	n	y	n
Goal Commitment	15.04	0.031	8	1	5	2	6	0	5	7	8	0	5	5	4	4	11	5
Perceived Observability	16.72	0.015	8	1	2	5	1	5	5	7	4	4	5	5	0	8	6	10

Associations according to countries

According to Table 4.30 (Countries) it is possible to notice that over half the actions (13 out of 22) depend on the country where the hospital is located. This fact verifies hypothesis 2, according to which *the national guidelines influence the actions carried out by the hospitals*.

Table 4.30: Countries

	Chi-Square	Prob.	<i>Country</i>															
			AUS		GER		ITA		SUI		UK		USA		N/A			
			y	n	y	n	y	n	y	n	y	n	y	n	y	n		
Perc. Usefulness	21.38	0	1	0	2	8	6	0	3	7	7	0	36	28	1	4		
Support	15.46	0.010	1	0	2	7	5	1	5	5	7	0	46	17	2	1		
Preparation	15.82	0.009	1	0	4	6	5	1	3	7	5	2	49	14	1	2		
Time	15.08	0.011	1	0	3	7	6	0	3	7	5	2	44	19	2	1		
Inst. Commitment	13.91	0.018	1	0	2	8	6	0	5	5	3	4	42	21	2	1		
Culture	19.14	0.001	1	0	1	9	4	2	5	5	7	0	43	20	1	2		
Com. Behavior	15.69	0.011	1	0	4	6	5	1	4	6	7	0	50	13	2	1		
Voluntariness	23.7	0	1	0	2	8	5	1	5	5	7	0	52	11	2	1		
Perc. Observability	12.28	0.04	1	0	2	8	5	1	2	8	4	3	19	44	1	2		
Place	12.67	0.037	1	0	0	10	0	6	2	8	3	4	21	42	2	1		
Credits	25.62	0	1	0	0	10	3	2	2	8	2	3	45	18	2	1		
Needs	20.69	0.001	1	0	3	7	5	1	3	7	7	0	48	14	2	1		
Diploma	13.12	0.024	1	0	2	8	5	1	2	8	4	3	37	26	1	2		

It is possible to notice that in Austria the respondent carries out all the listed actions. In Germany and in Switzerland, most hospitals do not carry them out, while in Italy and in the UK the actions are mainly carried out.

Associations according to CME status

The following Table (4.31 - CME status) illustrates that most hospitals of countries where CME is mandatory specify the details of an eLearning activity (Preparation, see also Appendix A.8 on logistic regression), and inform the eLearners on the number of credits that can be collected by following a certain eLearning activity (Credits), while these parameters are observed to be less important for those countries where CME is semi-mandatory.

Table 4.31: CME status

	Chi-Square	Probability	<i>CME status</i>			
			Mandatory		Semi-mandatory	
			yes	no	yes	no
Preparation	5.75	0.022	60	7	21	9
Credits	5.17	0.038	49	4	31	10

This association verifies the sub hypothesis 2b for which *the CME status of a country influences decisions regarding the credits healthcare professionals need to collect*. In the following sections cluster analysis is carried out.

Recapitulating the most important facts of this section, it is possible to say that large hospitals tend to inform eLearners about the advantages in participating to an event, and to indicate the criteria with which it is being organized. Most teaching hospitals do not give directions on the correct environment where the eLearning activities should take place. 60% of the actions depend on the country where the hospital is located. Finally, most hospitals of countries with mandatory CME tell the eLearners how many credits can be collected by following a certain eLearning activity.

4.4.6 Cluster analysis

Cluster analysis was carried out to identify respondents who gave similar answers. The 49 clustering variables taken into consideration are listed in Table 4.32. Variables with a large number of missing answers were removed.

Table 4.32: Clustering variables

<i>Variable</i>	<i>Variable</i>
Nr. Employees	Involve persons who like eL
Teaching Status	Importance of Involve persons who like eL
Location	Train the participants
Type of institution	Importance of Train the participants
eLearning status	Clarify advantages
Relevance between eL activity and job	Importance of Clarify advantages
Importance of eL activity for the job	Create incentives
Management support	Importance of Create incentives
Importance of management support	Analyze expectations
Technical and content support	Importance of Analyze expectations
Importance of Technical and content support	Opportunity to try tools
Expected changes in the profession	Importance of Opportunity to try tools
Importance of Expected changes in the profession	Place guidelines
eL activity details	Importance of Place guidelines
Importance of eL activity details	Specify nr. of CME credits
Time restrictions	Importance of Specify nr. of CME credits
Importance of Time restrictions	Community of practice
Goals of the hospital	Importance of Community of practice
Importance of Goals of the hospital	List of courses
Line up eL with other activities	Importance of List of courses
Importance of Line up eL with other activities	Identify needs
Use of internal communication channels	Importance of Identify needs
Importance of Use of internal communication channels	Provide a diploma
Compulsory vs. voluntary	Importance of Providing a diploma
Importance of Compulsory vs. voluntary	

Hierarchical clustering was carried out and a dendrogram was created using Ward's method, "of the hierarchical methods, the average linkage method and Ward's procedure have been shown to perform better than the other procedures" (Malhotra, 1996). Ward's method was

chosen because it proved to better represent the clusters (with the average linkage method only 2 clusters are found with a small number of cases). This procedure uses the squared Euclidian distance to measure similarity between the variables.

In the dendrogram (see Appendix A.9) it is possible to trace the clusters and understand the distance between the clustered cases. Three clusters can be observed: the first cluster is represented by 18 cases, the second cluster is represented by 32 cases, and the third cluster is represented by 25 cases.

Cluster 1: descriptive statistics

The 18 answers in this cluster are provided from the following countries: 7 from the USA, 5 from Switzerland, 5 from Germany and 1 location is unknown (see Figure 4.29).

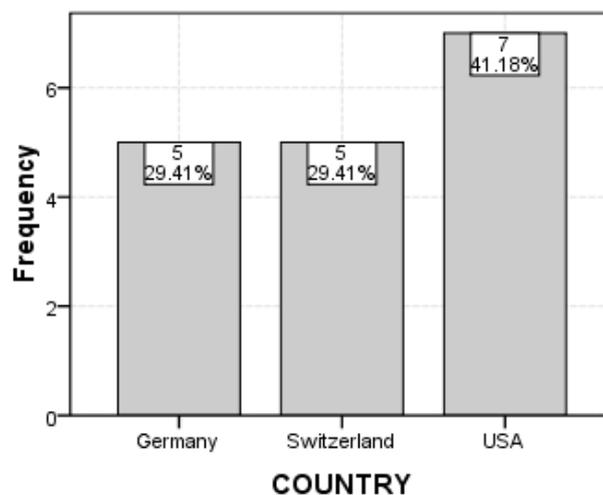


Figure 4.29: Countries (cluster 1)

In this cluster, the following similarities can be observed:

- a) The hospitals of this cluster have less than 5000 employees. The majority has less than 500 employees, with 13 out of 18 (72.2%) answers, 2 (11.1%) have from 501 to 1000, and 3 (16.7%) have from 5001 to 5000 employees.
- b) Most hospitals (72.2%) are non-teaching, while 27.8% are teaching hospitals.
- c) Most hospitals (72.2%) accept eLearning activities, while 27.8% do not.

Table (4.33) illustrates the carried out actions for cluster 1, including the overall corporate ranking. The actions are listed according to the eCME rank.

From this analysis it is possible to conclude that non-teaching hospitals with less than 5000 employees (small to medium sized) who accept eLearning activities mainly do not carry out the actions. This could also be observed in the categorical analysis (see section 4.4.5). Table (4.34) illustrates the importance of the actions for cluster 1, including the corporate eLearning readiness rank and the eCME readiness rank. Several observations can be made about the importance of the actions:

- Higher scores were given in comparison to the eCME rank
- Four of the five elements not available in the corporate rank score in the top 7.

The next section presents the second cluster.

Table 4.33: Cluster 1, actions carried out (actions listed according to the eCME rank)

<i>ACTION</i>	<i>DESCRIPTION</i>	<i>CeLeRI</i>	<i>YES</i>	<i>NO</i>	<i>Y(%)</i>	<i>N(%)</i>
Voluntariness	Inform about the voluntariness of the activity	6	1	17	5.6	94.4
Communication Behavior	Use of internal communication channels to inform about eLearning activities	3	2	16	11.1	88.9
Needs	Identify the educational needs of the eLearners	N/A	1	17	5.6	94.4
Support	Provide technical and content support during the activity	4	2	16	11.1	88.9
Preparation	Specify details of the activity (start, contents, objectives, etc)	2	2	16	11.1	88.9
Time	Set time restrictions	10	1	17	5.6	94.4
Corporate Motivation	Management support	5	2	16	11.1	88.9
Culture	Line up eLearning activities with other training activities	8	1	17	5.6	94.4
Institutional Commitment	Specify the hospital's goals	9	2	16	11.1	88.9
List	Provide a list of courses with detailed description	N/A	1	17	5.6	94.4
Perceived Usefulness	Underline relevance between eL activity and the job	7	2	16	11.1	88.9
Goal Commitment	Specify the expected changes in the professional practice	1	2	16	11.1	88.9
Credits	Specify the nr. of credits	11	0	18	0	100
Perceived Relative Advantage	Clarify possible advantages of eLearning activities	N/A	0	18	0	100
Diploma	Giving a formal diploma to the participants	N/A	0	18	0	100
Training	Train learners to gain skills to attend eLearning activities	12	0	18	0	100
Peer Communication	Involve persons who like eL	16	1	17	5.6	94.4
Perceived Observability	Give the opportunity to try eL technologies	13	0	18	0	100
Experience and Expectations	Analyze learners' experience and expectations of eLearning	14	0	18	0	100
Place	Set guidelines on a correct environment for eL activities	17	1	17	5.6	94.4
Incentives	Create incentives for eL results	15	0	18	0	100
Community	Emphasize possibility to be part of a community of practice	N/A	1	17	5.6	94.4

Table 4.34: Importance of the actions of Cluster 1

<i>Importance of:</i>	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>CeLeRI</i>	<i>eCMERI</i>
Providing a list of courses	18	1	5	3.11	1.08	N/A	11
Use of internal communication channels (Communication Behaviour)	18	2	5	3.11	0.83	8	19
Explaining relevance between eL activity and job (Perceived Usefulness)	18	2	5	3.11	0.76	1	10
Creating incentives	18	1	5	3.06	1.00	14	2
Providing a diploma	18	1	5	3.00	1.19	N/A	9
Community of practice	18	2	5	3.00	.69	N/A	1
Specifying nr. of CME credits	18	1	5	3.00	1.19	N/A	12
Analyzing expectations (Experience & Expectations)	18	2	5	3.00	0.91	15	5
Time restrictions	18	1	5	3.00	0.97	10	16
Clarifying advantages (Perceived Relative Advantage)	18	1	5	3.00	0.91	13	6
Specifying eL activity details (Preparation)	18	1	5	3.00	0.91	5	20
Lining up eL with other activities (Culture)	18	1	5	2.94	0.87	7	13
Technical and content support	18	1	5	2.94	1.11	3	18
Management support (Corporate Motivation)	18	1	5	2.89	0.90	2	15
Identifying needs	18	2	5	2.89	0.76	N/A	22
Compulsory vs. voluntary	18	2	5	2.89	0.68	9	21
Explaining the goals of the hospital (Institutional Commitment)	18	1	5	2.89	0.83	6	14
Opportunity to try tools (Perceived Observability)	18	1	5	2.83	1.04	16	4
Training the participants	18	1	5	2.83	1.15	12	8
Explaining the expected changes in the profession (Goal Commitment)	18	2	5	2.83	0.71	4	17
Place guidelines	18	1	5	2.78	.88	17	3
Involving persons who like eL (Peer Communication)	18	1	5	2.78	1.22	11	7

Cluster 2: descriptive statistics

The answers in this cluster are provided from the following countries: 23 out of 32 from the USA, 2 from the UK, 2 from Switzerland, 2 from Italy, 1 from Germany, 1 from Austria and 1 location is unknown (see Figure 4.30).

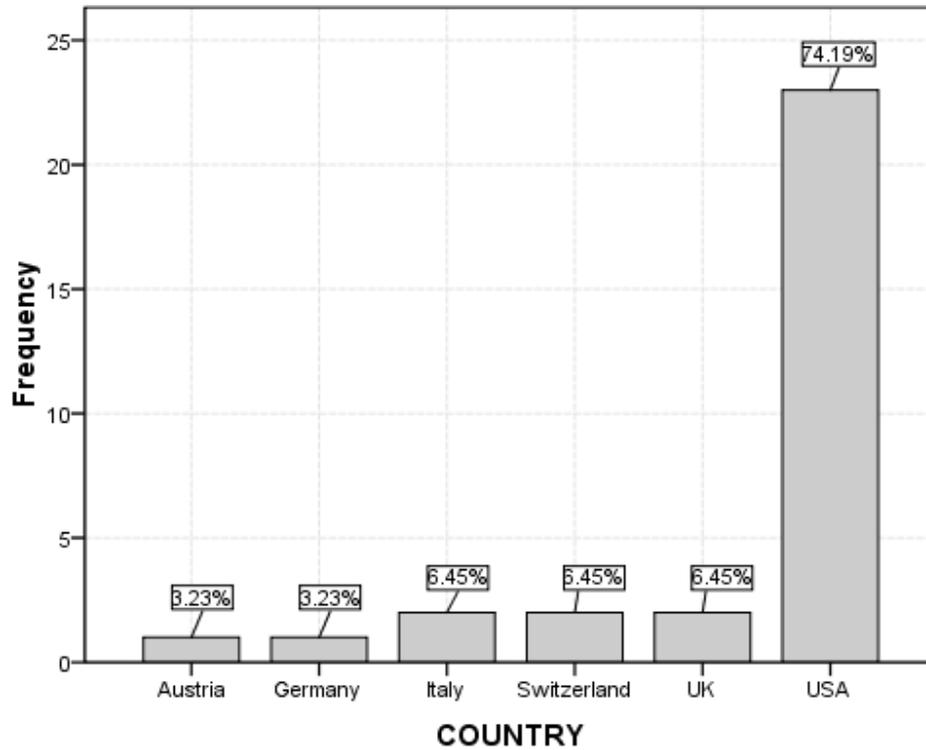


Figure 4.30: Countries (cluster 2)

In this cluster, the following similarities can be observed:

- a) Most hospitals of this cluster (65.6%) are non-governmental, while 21.9% are governmental and 12.5% are for profit.
- b) 93.8% of the hospitals (30 out of 32) accept eLearning.

Table 4.35 illustrates the carried out actions for cluster 2, including the corporate ranking. It is possible to conclude that non-governmental hospitals who accept eLearning tend to carry out the actions.

Table 4.35: Cluster 2, actions carried out (actions listed according to the eCME rank)

<i>ACTION</i>	<i>DESCRIPTION</i>	<i>CeLeRI</i>	<i>YES</i>	<i>NO</i>	<i>Y(%)</i>	<i>N(%)</i>
Voluntariness	Inform about the voluntariness of the activity	6	31	1	96.9	3.1
Communication Behavior	Use of internal communication channels to inform about eLearning activities	3	30	2	93.8	6.2
Needs	Identify the educational needs of the eLearners	N/A	31	1	96.9	3.1
Support	Provide technical and content support during the activity	4	28	4	87.5	12.5
Preparation	Specify details of the activity (start, contents, objectives, etc)	2	29	3	90.6	9.4
Time	Set time restrictions	10	30	2	93.8	6.2
Corporate Motivation	Management support	5	26	6	81.2	18.8
Culture	Line up eLearning activities with other training activities	8	30	2	93.8	6.2
Institutional Commitment	Specify the hospital's goals	9	26	6	81.2	18.8
List	Provide a list of courses with detailed description	N/A	27	5	84.4	15.6
Perceived Usefulness	Underline relevance between eL activity and the job	7	26	6	81.2	18.8
Goal Commitment	Specify the expected changes in the professional practice	1	26	6	81.2	18.8
Credits	Specify the nr. of credits	11	27	5	84.4	15.6
Perceived Relative Advantage	Clarify possible advantages of eLearning activities	N/A	28	4	87.5	12.5
Diploma	Giving a formal diploma to the participants	N/A	22	10	68.8	31.2
Training	Train learners to gain skills to attend eLearning activities	12	26	6	81.2	18.8
Peer Communication	Involve persons who like eL	16	19	13	59.4	40.6
Perceived Observability	Give the opportunity to try eL technologies	13	17	15	53.1	46.9
Experience and Expectations	Analyze learners' experience and expectations of eLearning	14	19	13	59.4	40.6
Place	Set guidelines on a correct environment for eL activities	17	17	15	53.1	46.9
Incentives	Create incentives for eL results	15	14	18	43.8	56.2
Community	Emphasize possibility to be part of a community of practice	N/A	11	21	34.4	65.6

Table (4.36) illustrates the importance of the actions for cluster 2, including the corporate eLearning readiness rank and the eCME readiness rank. It illustrates that the importance of the actions scores lower than in cluster 1. The ranking is similar to the eCME readiness index.

Table 4.36: Importance of the actions, cluster 2

<i>Importance of:</i>	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>S. Dev</i>	<i>CeLeRI</i>	<i>eCMERI</i>
Creating incentives	32	1	5	2.53	0.95	14	2
Community of practice	32	1	5	2.47	1.05	N/A	1
Place guidelines	32	1	5	2.31	1.12	17	3
Providing a diploma	32	1	5	2.19	0.97	N/A	9
Analyzing expectations (Experience & Expectations)	32	1	4	2.12	0.75	15	5
Involving persons who like eL (Peer Communication)	32	1	3	2.06	0.76	11	7
Opportunity to try tools (Perceived Observability)	32	1	4	2.06	0.91	16	4
Clarifying advantages (Perceived Relative Advantage)	32	1	4	1.91	0.82	13	6
Training the participants	32	1	3	1.78	0.75	12	8
Explaining relevance between eL activity and job (Perceived Usefulness)	32	1	5	1.78	0.83	1	10
Specifying nr. of CME credits	32	1	3	1.72	0.77	N/A	12
Technical and content support	32	1	4	1.69	0.74	3	18
Time restrictions	32	1	3	1.66	0.60	10	16
Lining up eL with other activities (Culture)	32	1	3	1.62	0.55	7	13
Providing a list of courses	32	1	3	1.62	0.66	N/A	11
Use of internal communication channels (Communication Behaviour)	32	1	3	1.62	0.66	8	19
Explaining the goals of the hospital (Institutional Commitment)	32	1	3	1.59	0.62	6	14
Explaining the expected changes in the profession (Goal Commitment)	32	1	3	1.56	0.67	4	17
Management support (Corporate Motivation)	32	1	2	1.56	0.50	2	15
Compulsory vs. Voluntary	32	1	3	1.53	0.57	9	21
Specifying eL activity details (Preparation)	32	1	3	1.47	0.57	5	20
Identifying needs	32	1	3	1.34	0.60	N/A	22

The following section presents the third cluster.

Cluster 3: descriptive statistics

The answers in this cluster are provided from the following countries: 80% from the USA, 8% from the UK, 8% from Switzerland, and 4% from Italy (see Figure 4.31).

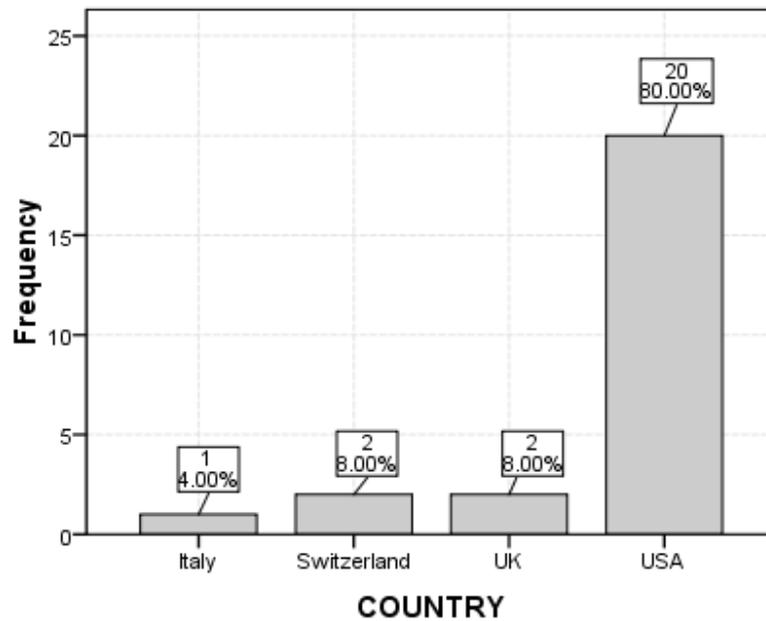


Figure 4.31: Countries (cluster 3)

In this cluster, the following similarities can be observed:

- a) Most hospitals are urban (20 out of 25)
- b) All hospitals accept eLearning

The following Table (4.37) illustrates the carried out actions for cluster 3, including the corporate ranking. The actions are carried out similarly to the overall ranking (see Table 4.22). Most actions carried out in the eCME ranking, are carried out by this cluster as well. Exceptions are the number of credits and the handing out of a diploma which score higher.

Table 4.37: Cluster 3, actions carried out (actions listed according to the eCME rank)

<i>ACTION</i>	<i>DESCRIPTION</i>	<i>CeLeRI</i>	<i>YES</i>	<i>NO</i>	<i>Y(%)</i>	<i>N(%)</i>
Voluntariness	Inform about the voluntariness of the activity	6	24	1	96	4
Communication Behavior	Use of internal communication channels to inform about eLearning activities	3	23	2	92	8
Needs	Identify the educational needs of the eLearners	N/A	19	6	76	24
Support	Provide technical and content support during the activity	4	21	4	84	16
Preparation	Specify details of the activity (start, contents, objectives, etc)	2	20	5	80	20
Time	Set time restrictions	10	16	9	64	36
Corporate Motivation	Management support	5	17	8	68	32
Culture	Line up eLearning activities with other training activities	8	17	8	68	32
Institutional Commitment	Specify the hospital's goals	9	15	10	60	40
List	Provide a list of courses with detailed description	N/A	17	8	68	32
Perceived Usefulness	Underline relevance between eL activity and the job	7	14	11	56	44
Goal Commitment	Specify the expected changes in the professional practice	1	15	10	60	40
Credits	Specify the nr. of credits	11	18	7	72	28
Perceived Relative Advantage	Clarify possible advantages of eLearning activities	N/A	12	13	48	52
Diploma	Giving a formal diploma to the participants	N/A	19	6	76	24
Training	Train learners to gain skills to attend eLearning activities	12	4	21	16	84
Peer Communication	Involve persons who like eL	16	4	21	16	84
Perceived Observability	Give the opportunity to try eL technologies	13	3	22	12	88
Experience and Expectations	Analyze learners' experience and expectations of eLearning	14	5	20	20	80
Place	Set guidelines on a correct environment for eL activities	17	5	20	20	80
Incentives	Create incentives for eL results	15	1	24	4	96
Community	Emphasize possibility to be part of a community of practice	N/A	1	24	4	96

The following Table (4.38) illustrates the importance of the actions for cluster 3, including the corporate eLearning readiness rank and the eCME readiness rank. It illustrates that the scores are higher than in the eCME readiness index.

Table 4.38: Importance of the actions, cluster 3

<i>Importance of:</i>	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>S. Dev.</i>	<i>CeLeRI</i>	<i>eCMERI</i>
Community of practice	25	2	5	3.36	0.81	N/A	1
Opportunity to try tools (Perceived Observability)	25	2	5	3.36	0.81	16	4
Creating incentives	25	2	5	3.36	0.76	14	2
Training the participants	25	2	5	3.16	0.75	12	8
Place guidelines	25	1	5	3.04	0.89	17	3
Involving persons who like eL (Peer Communication)	25	1	5	3.04	1.02	11	7
Analyzing expectations (Experience & Expectations)	25	2	5	2.92	0.86	15	5
Clarifying advantages (Perceived Relative Advantage)	25	1	5	2.84	0.75	13	6
Explaining relevance between eL activity and job (Perceived Usefulness)	25	1	5	2.64	0.81	1	10
Providing a list of courses	25	1	5	2.48	1.16	N/A	11
Explaining the expected changes in the profession (Goal Commitment)	25	1	5	2.48	1.09	4	17
Providing a diploma	25	1	4	2.44	0.92	N/A	9
Explaining the goals of the hospital (Institutional Commitment)	25	1	4	2.40	0.91	6	14
Lining up eL with other activities (Culture)	25	1	4	2.28	0.79	7	13
Technical and content support	25	1	4	2.20	0.87	3	18
Time restrictions	25	1	3	2.16	0.85	10	16
Specifying nr. of CME credits	25	1	5	2.16	1.18	N/A	12
Management support (Corporate Motivation)	25	1	4	2.16	0.80	2	15
Specifying eL activity details (Preparation)	25	1	4	2.12	0.88	5	20
Use of internal communication channels (Communication Behaviour)	25	1	3	2.04	0.79	8	19
Identifying needs	25	1	5	2.00	1.12	N/A	22
Compulsory vs. voluntary	25	1	3	1.96	0.74	9	21

In conclusion it is possible to say that urban hospitals that accept eLearning gave higher scores to the importance of the actions.

Recapitulating the clustering work, the following results were found: the actions of eCMERI are mainly not being carried out by small and medium sized non-teaching hospitals. The latter perceive the actions as more important in comparison to the overall ranking. On the other hand, non-governmental hospitals tend to carry out the actions but perceive them as less important in comparison to the non-teaching hospitals. Finally, urban hospitals behave similarly to the general sample but perceive the actions as more important in comparison to the overall ranking. The following sections present the factor analysis.

4.4.7 Factor analysis

The purpose of this section is to identify groups of variables. Table 4.39 contains the 50 variables used to carry out this analysis. Variables with a large number of missing answers were removed.

Table 4.39: Factor variables

<i>Variable</i>	<i>Variable</i>
Nr. Employees	Importance of Compulsory vs. voluntary
Teaching Status	Involve persons who like eL
Location	Importance of Involve persons who like eL
Type of institution	Train the participants
eLearning status	Importance of Train the participants
Year when eLearning started	Clarify advantages
Relevance between eL activity and job	Importance of Clarify advantages
Importance of eL activity for the job	Create incentives
Management support	Importance of Create incentives
Importance of management support	Analyze expectations
Technical and content support	Importance of Analyze expectations
Importance of Technical and content support	Opportunity to try tools
Expected changes in the profession	Importance of Opportunity to try tools
Importance of Expected changes in the profession	Place guidelines
eL activity details	Importance of Place guidelines
Importance of eL activity details	Specify nr. of CME credits
Time restrictions	Importance of Specify nr. of CME credits
Importance of Time restrictions	Community of practice
Goals of the hospital	Importance of Community of practice
Importance of Goals of the hospital	List of courses
Line up eL with other activities	Importance of List of courses
Importance of Line up eL with other activities	Identify needs

<i>Variable</i>	<i>Variable</i>
Use of internal communication channels	Importance of Identify needs
Importance of Use of internal communication channels	Providing a diploma
Compulsory vs. voluntary	Importance of Providing a diploma

According to the carried out tests, the three factors presented below are reliable. The Kaiser-Meyer-Olkin measure is rather close to 1 (KMO=0.81) and Barlett's test of sphericity rejects the null hypothesis ($\chi^2=2.579E3$), verifying that factor analysis is appropriate. The Rotated Component Matrix (see Appendix A.10) represents the correlations between the variable and the factor, ordered by size. No correlations less than 0.4 were printed to read the output more easily. Low correlations would not be meaningful for the analysis. Rotation allows maximizing the loading of each variable on one of the extracted factors and minimizes the loading on the other factors (Field, 2005).

The following points list the identified factors. Thanks to the reliability tests that were carried out (see the Cronbach's alpha value of each element) the following highly reliable factors are revealed:

- Factor 1 (Actions carried out by the hospitals) includes the observed variables: voluntariness, preparation, communication behavior, goal commitment, time, needs, support, corporate motivation, perceived relative advantage, culture, institutional commitment, training, credits, list, peer communication, perceived observability, perceived usefulness, diploma, place). Cronbach's alpha for factor 1 is 0.94; this value indicates a reliable scale.
- Factor 2 (activities and organizational aspects) is composed of the importance of several actions carried out by the hospitals: importance of preparation, importance of credits, importance of voluntariness, importance of the hospital's goals, importance of lining up with other eLearning activities, importance of using internal communication channels, importance of having a list of activities, importance of

management support, importance of technical support, importance of the expected changes, importance of the needs, importance of time, importance of the perceived usefulness. This factor includes the importance of those actions that take care of the organizational aspects of the eLearning activities, it can be called *activity*. Cronbach's alpha for factor 2 is 0.939, this value indicates a reliable scale.

- Factor 3 (organizational aspects for learners) is composed of the importance of the remaining actions carried out by the hospitals: importance of training, importance of peer communication, importance of perceived observability, importance of experience and expectations, importance of creating incentives, importance of perceived relative advantage, and importance of the place. This factor includes the importance of those actions that take care of organizational aspects to be taken care of by the learners, it can be called *learner*. Cronbach's alpha for factor 3 is 0.868, this value indicates a reliable scale.

In conclusion, the three factors can be explained as follows. Factor 1 represents the actions carried out by the hospitals; factor 2 includes the importance of the actions that mainly the CME managers take care of in order to organize the activities; factor 3 represents the importance of the actions that concern the learner directly. The following section presents several comparisons between the results discussed in this Chapter.

4.4.8 Comparing means: t-tests

Independent t-tests were carried out because conditions with two different groups of participants were analyzed. The following sections present comparisons between eCMERI and CeLeRI, between for-profit hospitals and companies, between for-profit hospitals that accept eLearning and companies, and finally between hospitals located in countries with mandatory or semi-mandatory CME.

eCME Readiness Index vs. eLearning Readiness Index

In Table 4.40 it is possible to notice that group 0 (the hospitals) had around 100 answers, while group 1 (the companies) had 54. In all cases the eLearning managers working for companies gave higher scores to the importance of the actions, smaller standard deviations can be noticed for the latter, too. Furthermore, Table 4.40 illustrates the means of all variables. Two rather close mean ranks can be observed for the *importance of creating incentives* and the *importance of setting guidelines to create the correct environment* marked in bold in the following Table (4.40).

Table 4.40: Ranks - eCME readiness index vs. eLearning Readiness Index

<i>Importance of:</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>
Explaining relevance between eL activity and job (Perceived Usefulness)	0	101	2.43	1.05
	1	54	4.48	0.69
Management support (Corporate Motivation)	0	99	2.21	1.04
	1	54	4.33	0.91
Technical and content support	0	100	2.18	1.07
	1	54	4.28	0.90
Explaining the expected changes in the profession (Goal Commitment)	0	100	2.19	0.97
	1	54	4.22	0.79
Specifying eL activity details (Preparation)	0	100	2.10	1.00
	1	54	4.11	0.86
Time restrictions	0	100	2.20	0.99
	1	54	3.63	1.00
Explaining the goals of the hospital (Institutional Commitment)	0	100	2.23	0.97
	1	54	4.13	0.93
Lining up eL with other activities (Culture)	0	99	2.23	0.94
	1	54	4.09	0.98
Use of internal communication channels (Communication Behaviour)	0	99	2.12	0.93
	1	54	3.96	0.97
Compulsory vs. voluntary	0	100	2.00	0.91
	1	54	3.89	1.02
Involving persons who like eL (Peer Communication)	0	100	2.54	1.13
	1	54	3.50	1.15
Training the participants	0	98	2.52	1.08
	1	54	3.44	1.09
Clarifying advantages (Perceived Relative Advantage)	0	98	2.56	0.99
	1	54	3.24	1.23
Creating incentives	0	100	2.90	0.99
	1	54	3.19	1.10
Analyzing expectations (Experience & Expectations)	0	97	2.65	0.97
	1	54	3.17	1.18
Opportunity to try tools (Perceived Observability)	0	98	2.66	1.04
	1	54	3.15	1.22
Place guidelines	0	98	2.71	1.03
	1	54	2.81	1.12

Also the t-test indicates that the two groups (companies and hospitals) are significantly different. It verifies a similarity between the above mentioned variables: the importance of *creating incentives* with $p = 0.103$, and the importance of *setting guidelines to create the correct environment where the eLearning activity should take place*, with $p = 0.576$. The t-

test is significant when the probability (p) is bigger than 0.05 (Malhotra, 1999). These variables received similar scores by the two tested groups.

For profit hospitals vs. companies

In this section, a t-test is presented between for-profit hospitals (group 0) and the companies (group 1). In Table 4.41 it is possible to notice that group 0 had 15 participants, while group 1 had 54. In order to run the tests all for profit hospitals of the sample were selected. Five rather close mean ranks can be observed (see Table 4.41) with the following variables: the *importance of the perceived relative advantage* of eLearning, the *importance of creating incentives*, the *importance of analysing the learners' experiences and expectations*, the *importance of the perceived observability* (to try the technologies out before starting the activity) and finally the *importance of setting guidelines for a correct learning environment*. Observing the means, it is possible to comment that companies gave higher scores to the actions than for-profit hospitals. Furthermore the standard deviations for group 1 indicate that the scores are closer to the means than they are for group 0.

Table 4.41: Ranks - for profit hospitals vs. companies

<i>Importance of:</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>
Explaining relevance between eL activity and job (Perceived Usefulness)	0	15	2.73	1.03
	1	54	4.48	0.69
Management support (Corporate Motivation)	0	15	2.47	1.06
	1	54	4.33	0.91
Technical and content support	0	15	2.40	1.12
	1	54	4.28	0.90
Explaining the expected changes in the profession (Goal Commitment)	0	15	2.53	1.25
	1	54	4.22	0.79
Specifying eL activity details (Preparation)	0	15	2.53	1.30
	1	54	4.11	0.86
Time restrictions	0	15	2.33	1.35
	1	54	3.63	1.00
Explaining the goals of the hospital (Institutional Commitment)	0	15	2.53	1.13
	1	54	4.13	0.93
Lining up eL with other activities (Culture)	0	15	2.53	1.06
	1	54	4.09	0.98
Use of internal communication channels (Communication Behaviour)	0	15	2.60	1.24
	1	54	3.96	0.97
Compulsory vs. voluntary	0	15	2.47	0.99
	1	54	3.89	1.02
Involving persons who like eL (Peer Communication)	0	15	2.53	1.41
	1	54	3.50	1.15
Training the participants	0	15	2.73	1.34
	1	54	3.44	1.09
Clarifying advantages (Perceived Relative Advantage)	0	15	2.53	1.30
	1	54	3.24	1.23
Creating incentives	0	15	2.87	1.25
	1	54	3.19	1.10
Analyzing expectations (Experience & Expectations)	0	15	2.93	1.10
	1	54	3.17	1.18
Opportunity to try tools (Perceived Observability)	0	15	2.73	1.44
	1	54	3.15	1.22
Place guidelines	0	15	2.60	1.12
	1	54	2.81	1.12

Comparing companies and for-profit hospitals it is possible to observe that 5 out of 17 variables score similarly. Also the t-test value identifies the above mentioned variables as similar in the two groups: the *importance of the perceived relative advantage* of eLearning ($p = 0.06$), the *importance of creating incentives* ($p = 0.35$), the *importance of analysing the*

learners' experiences and expectations ($p = 0.49$), the *importance of the perceived observability* ($p = 0.27$) and the *importance of setting guidelines for a correct environment* ($p = 0.51$). In conclusion, almost one fourth of the scores are similar between the two groups. A bigger sample of for-profit hospitals might be needed to verify this test more accurately.

For profit hospitals that accept eLearning vs. companies

In this section, a t-test was carried out between for-profit hospitals that accept eLearning (group 0) and the companies (group 1). Group 0 had 9 participants, while group 1 had 54. In order to run the tests all for-profit hospitals that accept eLearning were selected. Four rather close mean ranks can be observed with the following variables: the *importance of creating incentives* ($p = 0.07$), the *importance of analysing the learners' experiences and expectations* ($p = 0.36$), the *importance of the perceived observability* ($p = 0.2$) and finally the *importance of setting guidelines for a correct learning environment* ($p = 0.23$). The results show that by eliminating for-profit hospitals that do not accept eLearning the similarity between hospitals and companies does not increase. A bigger sample, however, might prove differently.

Mandatory vs. semi-mandatory CME (CME status)

Finally, a t-test was carried out between the ranks of countries where CME is semi-mandatory (Group 0: Switzerland and United Kingdom) and the scores of countries where CME is obligatory (Group 1: Austria, Germany, Italy and the USA). Twenty similarities can be observed. Countries with semi-mandatory CME gave higher scores to most of the actions, the exceptions are marked in bold letters in Table 4.42: the *importance of the goal commitment* ($p = 0.009$) and the *importance of the institutional commitment* ($p = 0.021$), which present a significant difference between the means.

Table 4.42: Ranks - mandatory vs. semi-mandatory

<i>Importance of:</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>T-test</i>
Explaining relevance between eL activity and job (Perceived Usefulness)	0	16	2.62	0.62	.133
	1	80	2.32	1.07	
Management support (Corporate Motivation)	0	16	2.44	0.96	.269
	1	79	2.13	1.03	
Technical and content support	0	16	2.31	0.70	.581
	1	81	2.15	1.14	
Explaining the expected changes in the profession (Goal Commitment)	0	16	2.75	0.68	.009
	1	81	2.06	0.99	
Specifying eL activity details (Preparation)	0	16	2.38	0.72	.219
	1	81	2.04	1.04	
Time restrictions	0	16	2.44	0.73	.308
	1	81	2.16	1.03	
Explaining the goals of the hospital (Institutional Commitment)	0	16	2.75	0.93	.021
	1	81	2.14	0.96	
Lining up eL with other activities (Culture)	0	16	2.25	0.78	.847
	1	80	2.20	0.97	
Use of internal communication channels (Communication Behaviour)	0	15	2.27	0.80	.524
	1	81	2.10	0.96	
Compulsory vs. voluntary	0	16	2.06	0.85	.803
	1	81	2.00	0.92	
Involving persons who like eL (Peer Communication)	0	16	2.25	0.93	.310
	1	81	2.57	1.17	
Training the participants	0	15	2.53	1.06	.946
	1	80	2.51	1.10	
Clarifying advantages (Perceived Relative Advantage)	0	15	2.60	0.99	.749
	1	80	2.51	0.97	
Creating incentives	0	16	2.94	0.93	.895
	1	81	2.90	1.02	

Analyzing expectations (Experience & Expectations)	0	15	2.73	0.88	.608
	1	79	2.59	0.97	
Opportunity to try tools (Perceived Observability)	0	15	2.53	0.99	.604
	1	80	2.69	1.06	
Place guidelines	0	15	2.53	1.06	.452
	1	80	2.75	1.01	
Specifying nr. of CME credits	0	14	2.71	0.91	.097
	1	78	2.15	1.19	
Community of practice	0	15	3.00	0.85	.765
	1	76	2.92	0.95	
Providing a list of courses	0	15	2.60	1.18	.189
	1	77	2.19	1.06	
Identifying needs	0	16	2.31	0.95	.074
	1	79	1.80	1.06	
Providing a diploma	0	15	2.60	0.74	.683
	1	80	2.48	1.14	

The same results presented in this section can be observed with non-parametric tests (see Appendix A.11), with the exception of this last comparison between semi-mandatory and mandatory CME, where in the non-parametric tests the following four variables present a significant difference: the *importance of identifying the learners' needs*, the importance of specifying the *number of credits* the activity is worth, the *importance of specifying the goals the hospital wants to achieve*, and the *importance of the goal commitment*. It is interesting to notice that in both analyses (t-test and non-parametric) countries with semi-mandatory CME tend to give higher importance to the actions.

To recapitulate the carried out t-tests, the following results were found: learning managers working for companies gave higher scores to the importance of the actions in comparison to CME managers, showing large differences concerning the needs of the two fields; five close ranks (out of the 17 common actions) can be found between for profit hospitals and companies, showing bigger similarities between these two types of institutions; finally, countries with semi-mandatory CME gave higher scores to most of the actions, showing different trends according to the CME status of the countries. The following section

recapitulates the ranks of the Readiness Indexes presented in this Chapter offering a general overview.

4.5 Actions and their importance

This final section wants to summarize the various ranks and give an overview on the opinions of the learning managers and how they organize eLearning events. Table 4.43 illustrates eCMERI, the frequency of the carried out actions in hospitals, CeLeRI, and the frequency of the actions performed in the corporate sector.

It is possible to notice that while in the corporate sector the decisions to carry out the actions comply with the selected importance, in hospitals the situation is almost turned upside down. In fact, in this sector the actions that were identified as important are not being carried out, while the ones selected as unimportant are. Possible reasons for this might be the cost of the actions, the time needed for their organization (most CME managers are part of the healthcare personnel and therefore also have other tasks to fulfil), or the novelty of the topic. Furthermore, it is possible to observe that the parameters of eCMERI and CeLeRI are almost inverted; possible reasons may lay in the nature of healthcare related professions. In fact, in this context the possibility to participate to a community of practice is an ongoing issue (Moule, 2007; Peterson et al., 2007; Marziali & Cohene, 2007; Hara 2007). Additionally, it is important to clarify incentives and advantages to justify the selection of a specific course among a wide range of continuing educational offers. Finally, the possibility to use technologies might not be as certain as in the corporate sector (availability of computers at home or in the office). On the other hand factors like the educational needs of the professionals and the expected changes in the profession might be more obvious in the hospital context due to common trends throughout the various healthcare related organizations, this would explain why the related actions are found among the last in the eCMERI ranking. Moreover, defining the voluntariness to participate to an eLearning event

might be less important in a hospital because of the obligation (legal or moral) to participate to CME events, and because of the variety of ways CME can be achieved. The conclusions to this section are offered in Chapter 5.

Table 4.43: Action and importance ranks

<i>Action</i>	<i>eCMERI</i>	<i>Action carried out (Hospitals)</i>	<i>CeLeRI</i>	<i>Action carried out (companies)</i>
Community of practice (Community)	1	22	N/A	N/A
Create incentives (Incentives)	2	21	14	15
Place guidelines (Place)	3	20	17	17
Opportunity to try tools (Perceived Observability)	4	18	16	13
Analyze expectations (Experience and Expectations)	5	19	15	14
Clarify advantages (Perceived Relative Advantage)	6	14	13	11
Involve persons who like eL (Peer Communication)	7	17	11	16
Train the participants (Training)	8	16	12	12
Providing a diploma (Diploma)	9	15	N/A	N/A
Relevance between eL activity and job (Perceived Usefulness)	10	11	1	7
List of courses (List)	11	10	N/A	N/A
Specify nr. of CME credits (Credits)	12	13	N/A	N/A
Line up eL with other activities (Culture)	13	8	7	8
Goals of the hospital (Institutional Commitment)	14	9	6	9
Management support (Corporate Motivation)	15	7	2	5
Time restrictions (Time)	16	6	10	10
Expected changes in the profession (Goal Commitment)	17	12	4	1
Technical and content support (Support)	18	4	3	4
Use of internal communication channels (Communication Behaviour)	19	2	8	3
Specify eL activity details (Preparation)	20	5	5	2
Compulsory vs. voluntary (Voluntariness)	21	1	9	6
Identify needs (Needs)	22	3	N/A	N/A

The current Chapter presented the results of the pre-phase and the descriptive analysis on the pilot and the main phase. Correlations, categorical data analysis and logistic regression were

performed, cluster and factor analysis were carried out including a reliability test for the factors, and means comparison tests were performed. The next Chapter comments the results collected in this Chapter, and offers the conclusions.

Chapter 5 - Conclusions

5.1 Summary

The main purpose of the research was to study eLearning acceptance in hospitals and compare the findings to eLearning acceptance in the corporate field (Succi and Cantoni, 2008). This study led to the creation of an eCME Readiness Index (eCMERI) with the purpose of helping learning managers in hospitals to promote and organize eLearning activities in Continuing Medical Education. No similar research was found throughout the literature review.

A first investigation on the CME guidelines in Europe and in the USA pointed out that even though eLearning is an accepted way of participating to continuing education activities (recognized in 67% of the countries studied in 2006), few specific guidelines on its use are found (in only 30% of the countries there are restrictions on the number of credits one can collect by participating to eCME activities, and only two countries gave a definition of eLearning).

In the second investigation of the research, the acceptance of eLearning in hospitals was studied (77% of the analyzed hospitals at the end of 2007 and at the beginning of 2008 offered or allowed eCME activities, among which 54 were from the USA and 23 were European, see Table 4.15b), and compared to the acceptance of eLearning in a general corporate sector. A list of actions CME managers may carry out to promote eCME to the learners and to plan this type of activity is proposed, taking into consideration the eLearning Readiness Index proposed by Succi and Cantoni (2008) for the learning managers working in the corporate sector. The following sections present the parameters of eCMERI revealed thanks to a thorough literature review (Chapter 2), and ordered according to the opinions and the experience of the surveyed learning managers (Chapter 4). Furthermore, the most

important findings of the research are presented, and finally various comparisons between hospitals and the corporate sector are offered.

The Chapters of the dissertation were structured as follows: the first Chapter introduced the research explaining the objectives, prior researches and the hypotheses. The second Chapter provided the theoretical background for the research: it contained a literature review on the definitions and origins of eLearning situating the latter into CME, and it presented the theories the research was based on (diffusion theories, technology acceptance theories and the eLearning acceptance map).

The third Chapter described the methodology with which the research was conducted: it illustrated how the data was collected during the three stages of the study (pre-phase, pilot phase and main phase).

In Chapter four a new eLearning Readiness Index for hospitals was identified in the literature, based on the corporate index suggested by Succi C. and Cantoni L. (2008). Furthermore, the Chapter offered the results of the statistical analysis of the three phases with which it was possible to verify the hypotheses, it presented the final eCME Readiness Index, and a comparison between the latter and the eLearning Readiness Index (Succi and Cantoni, 2008). This last Chapter recapitulates the research questions, the hypotheses, and presents the conclusions.

5.2 Results discussion and contributions

This section presents the answers to the research questions and the verified hypotheses. It proposes an eCME Readiness Index for CME managers, it offers comparisons between the analyzed hospitals and organizations, and it explains the impact of the national guidelines on the actions carried out by the managers to promote eCME.

5.2.1 The eCME Readiness Index

This section presents the parameters of the eCME Readiness Index generated throughout the investigation. Research question 1 “Which actions can hospitals carry out to promote eLearning acceptance?” lead to the creation of a list of parameters that may be used by CME managers to promote eLearning activities. From the analysis in section 4.4.3 the following parameters for the eCME Readiness Index are revealed, ranked according to their importance:

1. Emphasize the possibility of being part of an online community of practice.
2. Create incentives and/or a recognition system for eLearning results (other than CME credits).
3. Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).
4. Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.
5. Analyse eLearners’ expectations and/or their previous experiences with eLearning.
6. Clarify the possible advantage(s) of eLearning (compared to other training solutions).
7. Identify persons who like eLearning activities and positively talk about them to their peers, and involve them in the process.
8. Prepare/train eLearners about relevant skills needed in order to successfully attend an eLearning experience (e.g.: time management, self-directed learning, etc.).
9. Giving a formal diploma (or similar) to participants.
10. Underline the relevance between the eLearning activity and the learner’s specialty or activity in the job.
11. Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits.
12. Specify how many CME credits/points the activity will be worth.

13. Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices.
14. Specify the goals the hospital wants to achieve by proposing the eLearning activity.
15. Encourage managers in supporting and getting involved in eLearning activities.
16. Set specific time restrictions/deadlines for the eLearning activity.
17. Specify the expected changes in the professional practice.
18. Provide technical and content support during the eLearning activity.
19. Use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, etc.).
20. Specify the details of the eLearning activity (starting/due date, contents, objectives, requirements, assignments, evaluation procedures, etc.).
21. Specify a target audience and/or the degree to which the activity is compulsory or voluntary.
22. Identify educational needs the healthcare professionals might have.

The eCME Readiness Index offers CME managers a guideline for the organization of eLearning activities in hospitals. The next section presents several comparisons between the hospital and the corporate fields.

5.2.2 Comparisons between hospitals and organizations

This section illustrates several comparisons between the studied hospitals and the organizations. Despite of being a part of the corporate sector, hospitals have different ways to promote eLearning in comparison to companies. Research question 2 "*How is eLearning acceptance in hospitals structured in comparison to the corporate sector*" is answered in this section. Large differences can be noticed between eCMERI and the CeLeRI. In total, five additional parameters needed to be added to the eCME Readiness Index. The following three new parameters were identified in the literature review:

- Specify how many CME credits/points the activity will be worth.
- Emphasize the possibility of being part of an online community of practice.
- Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits.

Additionally, two parameters were reused from the first list with 42 factors (see Appendix A.12) initially proposed by Succi (2007), which had been eliminated from the eLearning Readiness Index. These two factors were identified as important in the literature review presented in Chapter 2:

- Identify educational needs the healthcare professionals might have.
- Giving a formal diploma (or similar) to participants.

The peer communication (involving persons who like eLearning), which was not identified in the literature review but was kept in the questionnaire, was considered rather important by the CME managers (rank 7).

Furthermore, the scores of the two indexes were found to be highly different; according to the collected data, learning managers of companies perceive the actions that may promote eLearning as more important in comparison to the learning managers working for hospitals. The latter averagely gave lower scores to the importance of the parameters they were asked to evaluate (see Table 4.23). The findings show that the parameters of eCMERI and CeLeRI almost have opposite rankings. A possible explanation may be related to the characteristics of hospitals and of the learners' roles in the profession. The issue of creating a community of practice is highly discussed in the healthcare sector (Moule, 2007; Peterson et al., 2007; Marziali & Cohene, 2007; Hara, 2007), this might explain why this eCMERI parameter is found in a high position; incentives and advantages must be explained to choose a specific

eLearning course among the numerous available events (online and in-presence). Furthermore, in the hospital context the possibility and the place to use computers or other technological means might not be as clear as in the corporate sector (is there a computer room? Are there computers in the offices?).

Other factors (educational needs, expected changes in the profession, etc.) might be taken for granted in the hospital context due to common educational trends in the healthcare field (i.e. learn about new techniques to perform an operation), or due to the learners' experience in participating to continuing education activities (specify the details of the activity, use of internal communication channels). The obligation (legal or moral) to participate to CME might influence the importance of the voluntariness, because it implies attendance. Finally, the institutional goals of the eLearning activity might not be perceived as important because of common aims among the hospitals (patient wellbeing, treatment, etc.).

Another difference between the scores can be found comparing the actions carried out in the two settings with their identified importance. In the hospital sector the mostly performed actions are perceived as the least important, while the least present ones are seen as highly important. This behavior does not occur for the corporate sector, where the actions and their importance follow a similar performance. This might mean that the already carried out actions are perceived as granted, while the ones that are not being carried out are recognized as possible important implementations for the future. This behaviour was noticed during the pilot phase where several CME managers were interviewed but needs to be further analysed. Additional reasons might be the costs of the actions, the time needed to implement them, or the newness of the parameters listed in the questionnaire (and therefore in eCMERI).

Some similarities can be found between the for-profit hospitals of the studied sample and the corporate sector: 5 out of the 17 common parameters are similar (their variables have a close mean, see section 4.4.8):

- Clarify the possible advantage(s) of eLearning (compared to other training solutions).
- Create incentives and/or a recognition system for eLearning results (other than CME credits).
- Analyze eLearners' expectations and/or their previous experiences with eLearning.
- Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.
- Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).

Selecting only for-profit hospitals that accept eLearning and comparing them again to the companies, the similarities are reduced to four:

- Create incentives and/or a recognition system for eLearning results (other than CME credits).
- Analyse eLearners' expectations and/or their previous experiences with eLearning.
- Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.
- Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).

This finding might point out that hospitals that are about to introduce eLearning perceive the actions as more important (only 15.5% do not plan to introduce eLearning in the near future, see section 4.4.3).

The following section explains the impact of the national guidelines on the answers of the CME managers.

5.2.3 Impact of the national guidelines

This section clarifies what impact the national guidelines have on the eCME Readiness Index. Research question 3 “*Do the national guidelines have an impact on the actions carried out in Hospitals?*” was answered comparing the hospitals according to their country of origin.

The national guidelines were found to have an impact on the feedback given by learning managers in hospitals. 60% of the given answers depend on the country the respondent was participating from (see section 4.4.5).

Finally, a comparison was made between the mean values of the importance of the actions in countries with semi-mandatory CME (Switzerland and United Kingdom) and the scores of countries with obligatory CME (Austria, Germany, Italy and the USA). The findings revealed that countries with semi-mandatory CME gave higher scores to the majority of the actions. Also this analysis shows different trends according to the countries’ guidelines.

The following section illustrates the hypotheses of the research.

5.2.4 Hypotheses

In this section the hypotheses that derived from the above questions are presented.

Hypothesis 1: The eLearning Readiness Index (Succi and Cantoni, 2008) cannot be equally applied to different sectors; in particular differences are expected in the healthcare setting. The first hypothesis is verified according to the findings that verify its two sub-hypotheses:

Hypothesis 1a: The eLearning Readiness Index needs a reduction or an increase of the number of parameters depending on the sector.

As already presented in the previous sections, additional variables were found in the literature review (several actions were added to CeLeRI).

Hypothesis 1b: The parameters can have a different importance ranking.

A different rank of the actions was found, most actions perceived as important in the corporate context are thought as less important in hospitals and vice versa (see Table 4.23: eCME Readiness Index - Importance of the actions, ordered by mean).

Hypothesis 2: The National guidelines influence the answers of the hospitals.

Also this hypothesis was verified. As already mentioned answering research question 3, the categorical data analysis (see section 4.4.5) revealed that over half the carried out actions of eCMERI (13 out of 22) depend on the country where the hospital is located (see Table 4.30). In Germany and in Switzerland the tendency is not to perform the actions, while in Austria, Italy, the UK and the USA the actions are mostly carried out. The mentioned variables are: perceived usefulness, support, preparation, time, institutional commitment, culture, communication behavior, voluntariness, perceived observability, place, credits, needs and diploma.

Hypothesis 2a: The CME status of a country (obligatory, semi-mandatory or voluntary CME) influences decisions regarding the credits healthcare professionals need to collect.

This sub-hypothesis was verified. Associations with the CME status of a country proved that the national guidelines influence the provided information on the credits of the activity: most hospitals belonging to countries with mandatory CME inform the eLearners on the number of credits that can be collected. On the other hand this parameter is observed to be less important for those countries where CME is voluntary (see section 4.4.5).

The section that follows presents several additional observations that can be made thanks to the statistical analysis.

5.2.5 Additional observations

In the results analysis carried out in Chapter 4, several additional relevant aspects were revealed. Whether an action of the eCME Readiness Index is carried out or not, may depend on the following parameters (section 4.4.5): for 8 actions out of 22 the *size of the hospital* is relevant (hospitals with more than 1000 employees tend to carry out the following actions: perceived usefulness, specification of the number of credits, possibility to receive a diploma, corporate motivation, preparation, time restrictions, experience and expectations); and for 4 actions out of 22 (support, communication behavior, voluntariness, perceived observability) the *type of institution* is related; for-profit hospitals tend not to carry out the actions, while governmental and non-governmental hospitals mainly carry them out.

Finally, in section 4.4.7 it was possible to observe that urban hospitals and non-teaching hospitals gave higher scores to the importance of the actions in comparison to the overall sample. The next section presents the conclusions, the limitations of this research and suggestions for future studies.

5.3 Conclusions and limitations

The hospital sector widely differs from the corporate field. First of all, five additional actions are needed to promote eLearning in this context. This shows that hospitals require more complex guidelines to organize and promote eLearning than companies (there are many ways to collect CME credits, why should a physicians choose eLearning?). Secondly, dissimilar priorities are required to encourage eLearners to participate to the activities, which points out different requirements between the fields.

Thirdly, hospitals averagely gave lower scores to the importance of the actions to carry out in comparison to companies. The reason for this may be that CME managers want the learners to increase their knowledge about a certain topic, but might not necessarily be interested in the learning method the learners will choose to do so. Moreover, physicians do not like to be pushed, and since they are strongly obliged either by the rules of their association or by law to participate to CME activities, they will take their own initiative and will tend to search a way to collect continuing education credits. On the other hand in an organizational setting, there might be less strong guidelines on the continuing education of the involved professionals, therefore when a company needs their employees to learn something new, stronger organization and promotion of the activities is needed.

Some similarities are observed between for-profit hospitals and the companies, which may point out that for-profit hospitals have similar necessities to companies. One explanation could be that this type of hospital may have to promote activities that do not provide CME credits (this can be noticed thanks to the observed communalities with companies, especially the following: create incentives for eLearning results (other than CME credits)). A bigger sample of for-profit hospital might be needed to verify this more accurately.

The main limitation of the research is the small sample that accepted to answer the questionnaire despite the numerous contacted hospitals and the various attempts to obtain answers. In particular, a bigger sample of the single European countries would be necessary. Another limitation of the research is the lack of information that the questionnaire, due to its long layout, could provide about the organization and promotion of other learning methods (congresses, seminars, in-presence courses, etc.).

Appendix

A.1 Pre-phase Questionnaire - The role of eLearning in Continuing Medical Education.

The goal of this questionnaire is to collect data about the presence, the benefits and the contributions of eLearning activities in European Continuing Medical Education.

The questionnaire is part of a PhD research whose purpose is to explore the role of eLearning in Continuing Medical Education for health professionals in European countries.

The target groups of the questionnaire are the Medical Associations and the Health Ministries of the EU countries and the countries members of the EFTA. The questionnaire should take about 20 minutes to be filled in.

If you are interested in receiving the outcomes of this research, please indicate it at the end of the questionnaire. Data will be published only aggregated. No single specific case will be quoted without permission. For any questions, clarifications or suggestions do not hesitate to contact me (lara.bachmann@lu.unisi.ch).

Thank you very much for helping me in my PhD research!



Lara Bachmann

1. Personal information

- a. First name: b. Last name: c. Position: d. Department:
e. Address: f. Email: g. Phone number:

2. What are the aims of the Medical Association?

Questions about the Continuing Medical Education (CME) system

3. Does your country have a National CME system?

- Yes
 No

4. Which is your Country's National Accreditor?

(The National Accreditor is the association which decides which CME activities can be accredited and how many credits can be assigned to each CME activity).

5. In your Country is there a sole countrywide accreditor or several accreditors according to regions?

- Countrywide accreditor
 Regional accreditors
 Other:

6. Does each region have its own CME model?

- Yes
 No

7. Is the National Accreditor divided into disciplines/specialties?

- Yes

No

8. Does each organization have its own CME model?

Yes

No

9. Which is the total number of credits/points a physician has to collect through CME activities in one year? (If in your Country the milestone is different, please specify).

10. What does 1 credit/point correspond to?

1 hour

45 minutes

Depending on the type of event, please specify:

Other:

11. From the following CME activities, choose which types are recognized, and if available please add the minimum number/percentage of credits required and the maximum number/percentage allowed for each of them per year.

Participation to CME events, theoretical courses (congresses, seminars, etc.)

Practical courses _____

Individual activities (reading articles, books etc.) _____

eLearning - online activities _____

Clinical education _____

Education on the job _____

Other _____

12. Are credits for activities provided by the EACCME (The European Accreditation Council for Continuing Medical Education – <http://www.uems.net>) automatically recognized by your Country?

- Yes
- No

13. If not, please describe the procedure for them to be recognized (if any).

General questions about Continuing Medical Education (CME)

14. If you published any official statement about the importance of CME, please specify which one.

15. Question for the Medical Association:

Please mark which health professionals are members of your association and specify for each one if CME is mandatory by law (physicians are required by law to maintain their professional competence), semi mandatory (regulated by the profession, there is no re-licensing, but compliance with CME standards is necessary) or voluntary (physicians are free to decide for themselves).

- Physicians _____
- Dentists _____
- Psychologist / Psychotherapist _____
- Nurses _____
- Obstetricians _____
- Oculists _____
- Physiotherapists _____
- Pharmacists _____
- Veterinaries _____

- Chiropractors _____
- Osteopaths _____
- Dental hygenists _____
- Opticians _____
- Other _____
- Other _____
- Other _____
- Other _____

16. How many health professionals take part to CME activities?

17. Which are the consequences for a member who does not participate to CME activities?
(i.e. does he lose his license?)

18. What are the benefits for a member who participates to CME activities?

Questions about eLearning activities

19. Are eLearning activities eligible for accreditation?

- Yes (Please go to question number 22)
- No (Please go to question number 20)

20. If no, are there plans to introduce eLearning activities into the CME system?

- Yes (Please go to question number 21)
- No (Please go to question number 30)

21. If there are plans to introduce Elearning activities into the CME system, please give some information about it. (Please go to question number 30).

22. If yes, what eLearning activities are eligible?

- Online courses
- CDs – DVDs/other digital media
- Participation to videoconferences
- Participation to discussion forums
- Reading articles in the internet
- Reading emails about relevant material
- Other (s):

23. Who are the providers of online activities?

- Anybody can provide a course
- Medical Associations
- Hospitals
- Professional organizations
- Universities
- Individuals
- Other (s):

24. What rules apply for an eLearning activity to be added to the list of official CME activities?

25. What is the common word used for eLearning in your Country?

- eLearning
- Distance Education
- Distance Learning
- Online Learning
- Online Education
- Other:

26. If you published any official definition of eLearning, please specify which one.

27. According to you how can eLearning contribute to CME?

28. Which are the positive aspects that have been revealed from eLearning activities in your Country?

29. Which are the negative aspects (if any) that have been revealed from eLearning activities in your Country?

30. Are you available for an interview?

- Yes, on the phone
- Yes, in presence
- Yes, via a videoconference
- No

31. Are you interested in receiving the results of this research?

- Yes
- No

A.2 eLearning Readiness Index Questionnaire (Succi, 2007)

1. Each organization does different activities to prepare learners before launching/releasing an eLearning activity. Please, indicate if these activities are done by your organization (YES or NO).	
2. Please, indicate now your own opinion about the IMPORTANCE of the following activities (1 = not at all; 2 = slightly; 3 = moderately; 4 = quite important; 5 = extremely important).	
FACTOR	VARIABLE
1. to clarify the advantage(s) of eLearning (as compared with other training solutions)	P. Relative Advantage
2. to build a connection between the eLearning activity and the learner's job	P. Usefulness
3. to specify the behavioral/performance goals of the eLearning activity	Goal Commitment
4. to specify the organization's business goals for the eLearning activity	Institutional Commitment
5. to track eLearners' expectations and/or their previous experiences with eLearning	Experience & Expectations
6. to prepare/train eLearners about relevant issues and skills in order to attend successfully an eLearning experience (i.e. time management, self-directed learning, etc.)	Training
7. to specify details of the eLearning activity (start date, due date, content, objectives, outputs, requirements, assignments, evaluation procedures, etc.)	Preparation
8. to provide eLearners with the opportunity to try technologies/tools before actually starting the eLearning activity	P. Observability
9. to use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)	Communication Behaviour
10. to enlist managers in supporting and involving in eLearning activities	Corporate Motivation
11. to align eLearning activities with other training activities and with the organization's values, processes and practices	Culture
12. to place "champions" in the different locations to support activities	Peer Communication
13. to set specific time restrictions/deadlines for the eLearning activity	Time
14. to set guidelines for the physical environment where eLearning takes place (e.g., space, noise, interruptions, etc.)	Place
15. to specify a target audience and/or the degree to which the activity is compulsory or voluntary	Voluntariness
16. to create incentives and/or a recognition system for eLearning results	Incentives
17. to provide technical and content support during the eLearning activity	Support
3. Please indicate if the relative communicative actions are done or not by your organization (YES or NO).	
FACTOR	VARIABLE
1. to communicate the advantage(s) of eLearning (as compared with other training solutions)	P. Relative Advantage
2. to share the connection between the eLearning activity and the learner's job	P. Usefulness
3. to communicate the behavioral/performance goals of the eLearning activity	Goal Commitment
4. to share the organization's business goals for the eLearning activity	Institutional Commitment
5. to explain eLearners' about the importance of expectations and/or their previous experiences with eLearning	Experience & Expectations
6. to explain eLearners about relevant issues and skills in order to attend successfully an eLearning experience (i.e. time management, self-directed learning, etc.)	Training

7. to explain details of the eLearning activity (start date, due date, content, objectives, outputs, requirements, assignments, evaluation procedures, etc.)	Preparation
8. to explain eLearners about the opportunity to try technologies/tools before actually starting the eLearning activity	P. Observability
9. to invite managers at using communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)	Communication Behaviour
10. to invite managers at supporting and involving in eLearning activities	Corporate Motivation
11. to communicate the alignment of eLearning activities with other training activities and with the organization's values, processes and practices	Culture
12. to invite eLearners at contacting "champions" placed in the different locations to support activities	Peer Communication
13. to inform about specific time restrictions/deadlines for the eLearning activity	Time
14. to inform about guidelines for the physical environment where eLearning takes place (e.g., space, noise, interruptions, etc.)	Place
15. to inform about the target audience and/or the degree to which the activity is compulsory or voluntary	Voluntariness
16. to inform about incentives and/or a recognition system for eLearning results	Incentives
17. to inform about technical and content support during the eLearning activity	Support
4. In which sector does your organization operate?	Business services
	Chemical
	Communications
	Consulting
	Education
	Food & beverage
	Financial services
	Government
	Healthcare
	Hospitality/entertainment
	Insurance
	Manufacturing
	Non-profit organization
	Petrochemicals
	Pharmaceutical
Real estate	
Retail	
Transportation	
Technology	
Training supplier	
5. How many employees work in the organization?	1 – 500
	501 – 1000
	1001 - 10.000
	10.001 - 50.000
	50.001 - 100.000
	100.001 - 500.000
	500.001 - 1.000.000
	1.000.001 - more than 1.000.000
6. When did your organization start offering eLearning activities?	1995
	1996

	1997
	1998
	1999
	2000
	2001
	2002
	2003
	2004
	2005
	2006
	not yet
	7. Which is your role in the organization?
CLO	
eLearning Designer	
eLearning Consultant	
Learning Supplier	
Instructional Designer	
Teacher	
Technologist	
Training/Learning Manager	
Other	
8. Could you, please, indicate your name?	
9. Could you, please, indicate your email address?	

A.3 Pilot-phase questionnaire

Objective: discuss about the questionnaire with experts of the field, in order to collect ideas and understand what can be done better.

The questionnaire will be sent to 1000 hospitals in Europe and 1000 hospitals in USA/Canada. Its purpose is to identify which of the following actions that apply to the corporate sector, also apply to hospitals. Several actions have been added because they were considered important for the medical field.

Every hospital creates different actions to prepare learners before launching/releasing an eLearning activity. Please, indicate if these actions are done by your hospital. (YES or NO)

Please, indicate your own opinion about the IMPORTANCE of the actions

(1 = not at all; 2 = slightly; 3 = moderately; 4 = quite important; 5 = extremely important).

<i>ACTION 1</i>					YES	NO
Underline the relevance between the eLearning activity and the learner's specialty or activity in the job						
IMPORTANCE						
1	2	3	4	5		
<i>ACTION 2</i>					YES	NO
Encourage managers in supporting and getting involved in eLearning activities						
IMPORTANCE						
1	2	3	4	5		
<i>ACTION 3</i>					YES	NO
Provide technical and content support during the eLearning activity						
IMPORTANCE						
1	2	3	4	5		

ACTION 4					YES	NO	
Specify the expected changes in the medical practice or the behavioural/performance goals of the eLearning activity							
IMPORTANCE							
1		2		3		5	
ACTION 5					YES	NO	
Specify the details of the eLearning activity (starting date, due date, contents, objectives, outputs, requirements, assignments, evaluation procedures, etc.)							
IMPORTANCE							
1		2		3		5	
ACTION 6					YES	NO	
Specify the goals the hospital wants to achieve by proposing the eLearning activity							
IMPORTANCE							
1		2		3		5	
ACTION 7					YES	NO	
Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices							
IMPORTANCE							
1		2		3		5	
ACTION 8					YES	NO	
Use communication/internal marketing channels to promote the eLearning ACTION (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)							
IMPORTANCE							
1		2		3		5	
ACTION 9					YES	NO	
Specify a target audience and/or the degree to which the activity is compulsory or voluntary							
IMPORTANCE							
1		2		3		5	

<i>ACTION 10</i>					YES	NO			
Set specific time restrictions/deadlines for the eLearning activity									
IMPORTANCE									
1		2		3		4		5	
<i>ACTION 11</i>					YES	NO			
Identify persons who support/advertise the activities in the different branches/locations and involve them in the process (peer-to-peer).									
Identify persons who like eLearning activities and positively talk about them to their peers, and involve them in the process.									
IMPORTANCE									
1		2		3		4		5	
<i>ACTION 12</i>					YES	NO			
Prepare/train eLearners about relevant issues and skills needed in order to successfully attend an eLearning experience (i.e. time management, self-directed learning, etc.)									
IMPORTANCE									
1		2		3		4		5	
<i>ACTION 13</i>					YES	NO			
Clarify the advantage(s) of eLearning (compared to other training solutions)									
IMPORTANCE									
1		2		3		4		5	
<i>ACTION 14</i>					YES	NO			
Create incentives and/or a recognition system for eLearning results									
IMPORTANCE									
1		2		3		4		5	
<i>ACTION 15</i>					YES	NO			
Track eLearners' expectations and/or their previous experiences with eLearning									
IMPORTANCE									
1		2		3		4		5	

ACTION 16					YES	NO
Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity						
IMPORTANCE						
1	2	3	4	5		
ACTION 17					YES	NO
Set guidelines to create the correct environment where the eLearning activity should take place (e.g. space, noise, interruptions, participation from home/office, etc.)						
IMPORTANCE						
1	2	3	4	5		
ACTION 18					YES	NO
Specify how many CME credits the activity will be worth for the official credit collection						
IMPORTANCE						
1	2	3	4	5		
ACTION 19					YES	NO
Emphasize the possibility of being part of a community of practice						
IMPORTANCE						
1	2	3	4	5		
ACTION 20					YES	NO
Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits (self-service model)						
IMPORTANCE						
1	2	3	4	5		
ACTION 21					YES	NO
Identify needs and problems the healthcare professionals might have						
IMPORTANCE						
1	2	3	4	5		
ACTION 22					YES	NO
A quality output is given to the participants (e.g. a diploma)						

IMPORTANCE				
1	2	3	4	5
QUESTIONS 3-7				
3. What type of eLearning activities does your hospital offer?				ANSWER
				Online courses
				CDs – DVDs/other digital media
				Participation to videoconferences
				Participation to discussion forums
				Reading articles in the internet
				Reading emails about relevant material
				Other:
4. How many employees work in the hospital?				1 – 500
				501 – 1000
				1001 - 10.000
				10.001 - 50.000
				50.001 - 100.000
				100.001 - 500.000
				500.001 - 1.000.000
				more than 1.000.000
5. When did your hospital start offering eLearning activities?				1995
				1996
				1997
				1998
				1999
				2000
				2001
				2002
				2003
				2004
				2005
				2006
				2007
				not yet
6. Which is your role in the hospital?				Physician
				Nurse
				Director
				Human resources
				eLearning Designer
				eLearning Consultant
				Learning Supplier
				Instructional Designer

	Teacher
	Technologist
	Training/Learning Manager
	Other:
7. Please specify your name:	
7a. Please specify your email address:	
7b. Please specify your country:	

A.4 Main-phase Questionnaire - Acceptance of eLearning for Continuing Medical Education (CME) in Hospitals

PART I

1. How many healthcare employees (subjected to CME regulations) work in the hospital?			
<input type="checkbox"/> 1- 500 <input type="checkbox"/> 501 – 1000	<input type="checkbox"/> 1001 – 5000 <input type="checkbox"/> 5001 – 10000	<input type="checkbox"/> 10001 – 15000 <input type="checkbox"/> More than 15000	
2. Please specify the following characteristics of your hospital:			
a) Teaching status: <input type="checkbox"/> Teaching/University hospital <input type="checkbox"/> Non-teaching hospital	b) Location: <input type="checkbox"/> Urban hospital <input type="checkbox"/> Rural hospital	c) Type of institution: <input type="checkbox"/> Governmental <input type="checkbox"/> Non governmental <input type="checkbox"/> Investor-owned (for-profit)	
3. Does your hospital offer / use / allow eLearning activities? <input type="checkbox"/> yes <input type="checkbox"/> no (go to Q. 6)			
4. What type of eLearning activities does your hospital offer / use / allow? (more than one answer allowed)			
<input type="checkbox"/> Online courses <input type="checkbox"/> CDs – DVDs /other digital media <input type="checkbox"/> Participation to videoconferences <input type="checkbox"/> Participation to discussion forums		<input type="checkbox"/> Reading articles in the internet <input type="checkbox"/> Reading emails about relevant material <input type="checkbox"/> Other: _____	
5. When did your hospital start offering / using / accepting eLearning activities?			
<input type="checkbox"/> 1995 or before <input type="checkbox"/> 1996 <input type="checkbox"/> 1997 <input type="checkbox"/> 1998	<input type="checkbox"/> 1999 <input type="checkbox"/> 2000 <input type="checkbox"/> 2001 <input type="checkbox"/> 2002	<input type="checkbox"/> 2003 <input type="checkbox"/> 2004 <input type="checkbox"/> 2005 <input type="checkbox"/> 2006	<input type="checkbox"/> 2007 <input type="checkbox"/> not yet
6. In case your hospital is not offering eLearning activities at the moment, please specify if/when there are plans for introducing them:			
<input type="checkbox"/> In 1 year <input type="checkbox"/> In 2 years <input type="checkbox"/> In 3 years		<input type="checkbox"/> In 4 years <input type="checkbox"/> Other : <input type="checkbox"/> No plans	

PART II

7. For the following questions please indicate:

With YES or NO if your hospital is carrying out the following actions to prepare learners before releasing an eLearning activity

What is the IMPORTANCE of the action according to your experience

ACTION 1: Underline the relevance between the eLearning activity and the learner's specialty or activity in the job.

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 2: Encourage managers in supporting and getting involved in eLearning activities.

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 3: Provide technical and content support during the eLearning activity.

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 4: *Specify the expected changes in the professional practice.*

Is your hospital carrying out this action? Yes No

	Not at all	Slightly	Moderately	Quite	Extremely
IMPORTANCE of the action:					

ACTION 5: *Specify the details of the eLearning activity (starting/due date, contents, objectives, requirements, assignments, evaluation procedures, etc.).*

Is your hospital carrying out this action? Yes No

	Not at all	Slightly	Moderately	Quite	Extremely
IMPORTANCE of the action:					

ACTION 6: *Set specific time restrictions/deadlines for the eLearning activity.*

Is your hospital carrying out this action? Yes No

	Not at all	Slightly	Moderately	Quite	Extremely
IMPORTANCE of the action:					

ACTION 7: *Specify the goals the hospital wants to achieve by proposing the eLearning activity.*

Is your hospital carrying out this action? Yes No

	Not at all	Slightly	Moderately	Quite	Extremely
IMPORTANCE					

of the action:

ACTION 8: Line up eLearning activities with other training activities, with the profession's and the hospital's values, processes and practices.

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 9: Use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, etc.).

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 10: Specify a target audience and/or the degree to which the activity is compulsory or voluntary.

Is your hospital carrying out this action? Yes No

IMPORTANCE of the action:	Not at all	Slightly	Moderately	Quite	Extremely

ACTION 11: Identify persons who like eLearning activities and positively talk about them to their peers, and involve them in the process.

Is your hospital carrying out this action? Yes No

IMPORTANCE	Not at all	Slightly	Moderately	Quite	Extremely
of the action:					

ACTION 12: *Prepare/train eLearners about relevant skills needed in order to successfully attend an eLearning experience (e.g.: time management, self-directed learning, etc.).*

Is your hospital carrying out this action? Yes No

IMPORTANCE	Not at all	Slightly	Moderately	Quite	Extremely
of the action:					

ACTION 13: *Clarify the possible advantage(s) of eLearning (compared to other training solutions).*

Is your hospital carrying out this action? Yes No

IMPORTANCE	Not at all	Slightly	Moderately	Quite	Extremely
of the action:					

ACTION 14: *Create incentives and/or a recognition system for eLearning results (other than CME credits).*

Is your hospital carrying out this action? Yes No

IMPORTANCE	Not at all	Slightly	Moderately	Quite	Extremely
of the action:					

ACTION 15: *Analyse eLearners' expectations and/or their previous experiences with eLearning.*

Is your hospital carrying out this action?

Yes No

IMPORTANCE
of the action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 16: Provide eLearners with the opportunity to try technologies/tools before starting the eLearning activity.

Is your hospital carrying out this action?

Yes No

IMPORTANCE of the
action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 17: Set guidelines to create the correct environment where the eLearning activity should take place (e.g.: space, noise, interruptions, participation from home/office, etc.).

Is your hospital carrying out this action?

Yes No

IMPORTANCE of the
action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 18: Specify how many CME credits/points the activity will be worth

Is your hospital carrying out this action?

Yes No

IMPORTANCE of the
action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 19: Emphasize the possibility of being part of an online community of practice.

Is your hospital carrying out this action?

Yes No

IMPORTANCE
of the action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 20: Provide a list of courses with a detailed description of the contents (activities, course authors and teachers) and number of credits.

Is your hospital carrying out this action?

Yes No

IMPORTANCE
of the action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 21: Identify educational needs the healthcare professionals might have.

Is your hospital carrying out this action?

Yes No

IMPORTANCE
of the action:

Not at all	Slightly	Moderately	Quite	Extremely

ACTION 22: Giving a formal diploma (or similar) to participants.

Is your hospital carrying out this action?

Yes No

IMPORTANCE
of the action:

Not at all	Slightly	Moderately	Quite	Extremely

A.5 Descriptive Table of the variables

<i>PART I – HOSPITALS' CHATACTERISTICS</i>						
<i>Quest.</i>	<i>Var. Nr.</i>	<i>Variable</i>	<i>Variable's Name</i>	<i>Measure</i>	<i>VALID</i>	<i>MISS</i>
1	1	Nr. Employees	EMPLOYEES	Quantitative (classified)	102	1
2a	2	Teaching Status	TEACH	1-2	102	1
2b	3	Location	LOCATION	1-2	102	1
2c	4	Type of institution	INSTITUTION	1-3	102	1
3	5	eLearning status	EL_STATUS	0,1	101	2
4	6	Types of offered eL activities	EL_TYPE	1-7	82	21
5	7	Year when eLearning started	EL_START	Quantitative (1996-2007, 1995 or before, not yet)	76	27
6	8	Possible start of eL activities in future	EL_FUTURE	Quantitative (1-4, other, no plans)	21	82
<i>PART II – ACTIONS: ELEARNING IN CME</i>						
7 - 1a	9	Relevance between eL activity and job	P_Usefulness	0,1	103	0
7 - 1b	10	Importance of eL activity for the job	PU_IMP	1~5 (Likert)	101	2
7 - 2a	11	Management support	Corporate Motivation	0,1	100	3
7 - 2b	12	Importance of management support	CM_IMP	1~5 (Likert)	99	4
7 - 3a	13	Technical and content support	Support	0,1	99	4
7 - 3b	14	Importance of Technical and content support	SUP_IMP	1~5 (Likert)	100	3
7 - 4a	15	Expected changes in the profession	Goal Commitment	0,1	100	3
7 - 4b	16	Importance of Expected changes in the profession	GC_IMP	1~5 (Likert)	100	3
7 - 5a	17	eL activity details	Preparation	0,1	100	3
7 - 5b	18	Importance of eL activity details	PREP_IMP	1~5 (Likert)	100	3
7 - 6a	19	Time restrictions	Time	0,1	100	3
7 - 6b	20	Importance of Time restrictions	TIME_IMP	1~5 (Likert)	100	3

7 - 7a	21	Goals of the hospital	Inst_ Commitment	0,1	100	3
7 - 7b	22	Importance of Goals of the hospital	IC_IMP	1~5 (Likert)	100	3
7 - 8a	23	Line up eL with other activities	Culture	0,1	100	3
7 - 8b	24	Importance of Line up eL with other activities	CULT_IMP	1~5 (Likert)	99	4
7 - 9a	25	Use of internal communication channels	Comm_ Behaviour	0,1	100	3
7 - 9b	26	Importance of Use of internal communication channels	CB_IMP	1~5 (Likert)	99	4
7 - 10a	27	Compulsory vs. voluntary	Voluntariness	0,1	100	3
7 - 10b	28	Importance of Compulsory vs. voluntary	VOL_IMP	1~5 (Likert)	100	3
7 - 11a	29	Involve persons who like eL	Peer Communication	0,1	100	3
7 - 11b	30	Importance of Involve persons who like eL	PC_IMP	1~5 (Likert)	100	3
7 - 12a	31	Train the participants	Training	0,1	100	3
7 - 12b	32	Importance of Train the participants	TRAIN_IMP	1~5 (Likert)	98	5
7 - 13a	33	Clarify advantages	P_Relative_ Advantage	0,1	99	4
7 - 13b	34	Importance of Clarify advantages	PRA_IMP	1~5 (Likert)	98	5
7 - 14a	35	Create incentives	Incentives	0,1	100	3
7 - 14b	36	Importance of Create incentives	INC_IMP	1~5 (Likert)	100	3
7 - 15a	37	Analyze expectations	Experience_ Expectations	0,1	100	3
7 - 15b	38	Importance of Analyze expectations	EE_IMP	1~5 (Likert)	97	6
7 - 16a	39	Opportunity to try tools	P_Observability	0,1	100	3
7 - 16b	40	Importance of Opportunity to try tools	PO_IMP	1~5 (Likert)	98	5
7 - 17a	41	Place guidelines	Place	0,1	100	3
7 - 17b	42	Importance of Place guidelines	PLACE_IMP	1~5 (Likert)	98	5

7 18a	-	43	Specify nr. of CME credits	CREDITS	0,1	97	6
7 18b	-	44	Importance of Specify nr. of CME credits	CREDS_IMP	1~5 (Likert)	95	8
7 19a	-	45	Community of practice	COMMUNITY	0,1	100	3
7 19b	-	46	Importance of Community of practice	COMM_IMP	1~5 (Likert)	94	9
7 20a	-	47	List of courses	LIST	0,1	99	4
7 20b	-	48	Importance of List of courses	LIST_IMP	1~5 (Likert)	95	8
7 21a	-	49	Identify needs	NEEDS	0,1	99	4
7 21b	-	50	Importance of Identify needs	NEED_IMP	1~5 (Likert)	98	5
7 22a	-	51	Providing a diploma	DIPLOMA	0,1	100	3
7 22b	-	52	Importance of Providing a diploma	DIPL_IMP	1~5 (Likert)	98	5
<i>INFORMATION ABOUT RESPONDENT</i>							
8		53	Role in the hospital	ROLE	Open question	95	8
9		54	Professional background	BACKGROUN D	Open question	93	10
10		55	State and Country	COUNTRY	Open question	98	5
11a		56	Name	NAME	Open question	45	58
11b		57	Email address	EMAIL	Open question	44	59
12		58	Comments	COMMENTS	Open question	27	76

A.6 Parameters ranked according to their degree of presence (Corporate rank, Succi and Cantoni, 2008).

		<i>Y(%)</i>	<i>N(%)</i>	<i>Valid</i>	<i>Miss</i>
Goal Commitment	3. to specify the behavioral/performance goals of the eLearning activity	85	15	54	
Preparation	7. to specify details of the eLearning activity (start date, due date, content, objectives, outputs, requirements, assignments, evaluation procedures, etc.)	85	15	54	
Communication Behaviour	9. to use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)	80	20	54	
Support	17. to provide technical and content support during the eLearning activity	80	20	54	
Corporate Motivation	10. to enlist managers in supporting and involving in eLearning activities	78	22	54	
Voluntariness	15. to specify a target audience and/or the degree to which the activity is compulsory or voluntary	78	22	54	
P. Usefulness	2. to build a connection between the eLearning activity and the learner's job	76	24	54	
Culture	11. to align eLearning activities with other training activities and with the organization's values, processes and practices	75	25	53	1
Institutional Commitment	4. to specify the organization's business goals for the eLearning activity	70	30	53	1
Time	13. to set specific time restrictions/deadlines for the eLearning activity	69	31	54	
P. Relative Advantage	1. to clarify the advantage(s) of eLearning (as compared with other training solutions)	55	45	53	1
Training	6. to prepare/train eLearners about relevant issues and skills in order to attend successfully an eLearning experience (i.e. time management, self-directed learning, etc.)	45	55	53	1
P. Observability	8. to provide eLearners with the opportunity to try technologies/tools before actually starting the eLearning activity	33	67	54	
Experience & Expectations	5. to track eLearners' expectations and/or their previous experiences with eLearning	31	69	54	
Incentives	16. to create incentives and/or a recognition system for eLearning results	31	69	54	
Peer Communication	12. to place "champions" in the different locations to support activities	30	70	53	1
Place	14. to set guidelines for the physical environment where eLearning takes place (e.g., space, noise, interruptions, etc.)	30	70	54	

A.7 eLearning Readiness Index - Parameters ranked in according to their importance (Succi and Cantoni, 2008).

<i>Variable</i>	<i>Activity</i>	<i>Mean</i>	<i>S. Dev.</i>	<i>Valid</i>	<i>Miss</i>
P. Usefulness	2. to build a connection between the eLearning activity and the learner's job	4.48	0.69	54	0
Corporate Motivation	10. to enlist managers in supporting and involving in eLearning activities	4.33	0.91	54	0
Support	17. to provide technical and content support during the eLearning activity	4.28	0.90	54	0
Goal Commitment	3. to specify the behavioral/performance goals of the eLearning activity	4.22	0.79	54	0
Preparation	7. to specify details of the eLearning activity (start date, due date, content, objectives, outputs, requirements, assignments, evaluation procedures, etc.)	4.11	0.86	54	0
Institutional Commitment	4. to specify the organization's business goals for the eLearning activity	4.09	0.90	53	1
Culture	11 to align eLearning activities with other training activities and with the organization's values, processes and practices	4.09	0.98	54	0
Communication Behaviour	9. to use communication/internal marketing channels to promote the eLearning activity (direct communication, intranet, posters, newsletters, sponsoring activities, etc.)	3.92	0.94	53	1
Voluntariness	15. to specify a target audience and/or the degree to which the activity is compulsory or voluntary	3.89	1.02	54	0
Time	13. to set specific time restrictions/deadlines for the eLearning activity	3.63	1.00	54	0
Peer Communication	12. to place "champions" in the different locations to support activities	3.45	1.10	53	1
Training	6. to prepare/train eLearners about relevant issues and skills in order to attend successfully an eLearning experience (i.e. time management, self-directed learning, etc.)	3.44	1.09	54	0
P. Relative Advantage	1. to clarify the advantage(s) of eLearning (as compared with other training solutions)	3.24	1.23	54	0
Incentives	16. to create incentives and/or a recognition system for eLearning results	3.19	1.10	54	0
Experience & Expectations	5. to track eLearners' expectations and/or their previous experiences with eLearning	3.17	1.18	54	0
P. Observability	8. to provide eLearners with the opportunity to try technologies/tools before actually starting the eLearning activity	3.15	1.22	54	0

Place	14. to set guidelines for the physical environment where eLearning takes place (e.g., space, noise, interruptions, etc.)	2.81	1.12	54	0
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A.8 Logistic Regression - Variables not in the Equation

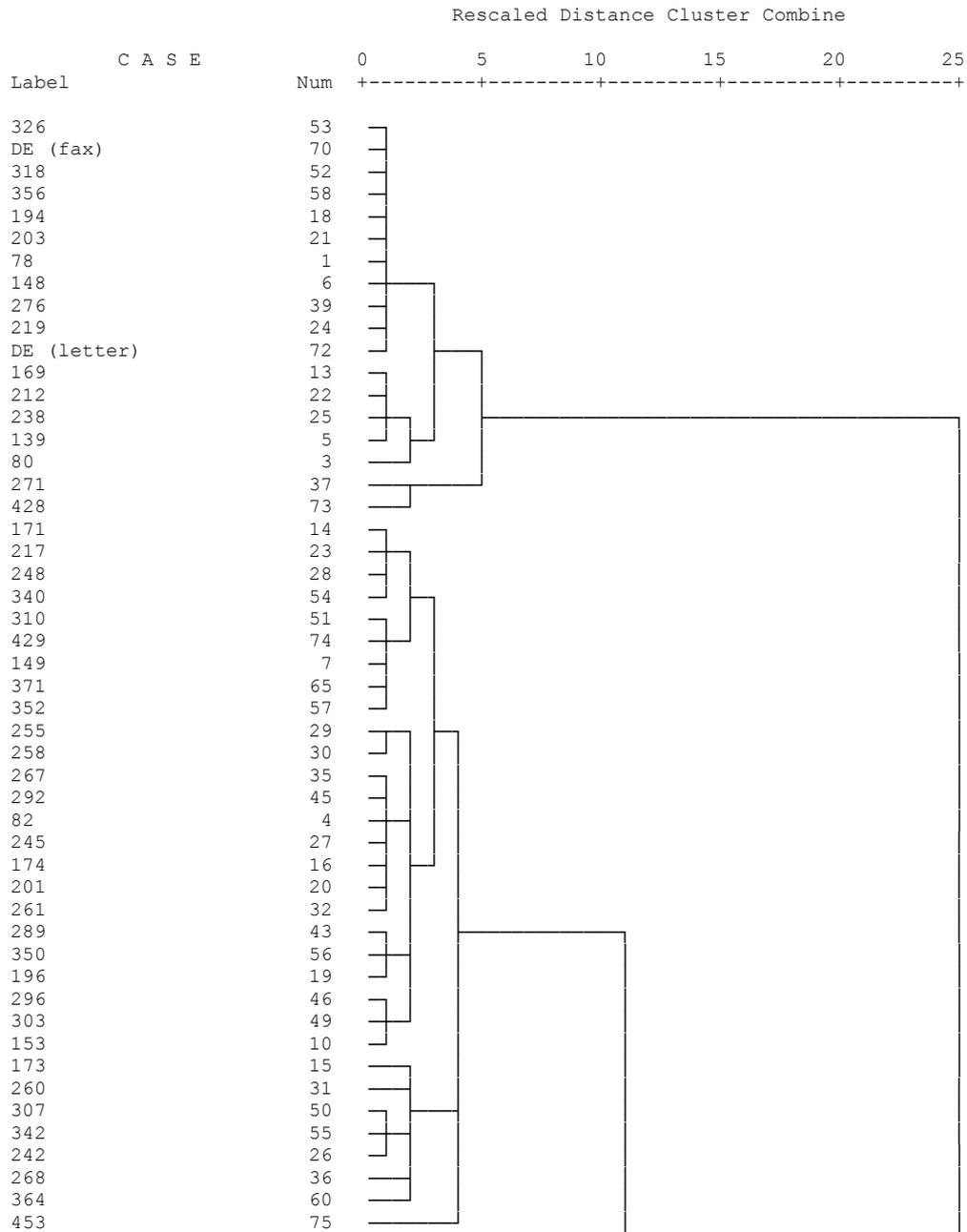
			<i>Score</i>	<i>df</i>	<i>Sig.</i>
Step 0	Variables	Q7b122	.774	1	.379
		Q7b222	.682	1	.409
		Q7b322	.535	1	.465
		Q7b422	4.239	1	.040
		Q7b522	3.874	1	.049
		Q7b622	3.666	1	.056
		Q7b722	3.666	1	.056
		Q7b822	.000	1	1.000
		Q7b922	1.199	1	.274
		Q7b1022	1.997	1	.158
		Q7b1122	.918	1	.338
		Q7b1222	.009	1	.923
		Q7b1322	.184	1	.668
		Q7b1422	.011	1	.915
		Q7b1522	.003	1	.956
		Q7b1622	.234	1	.628
		Q7b1722	.094	1	.759
		Q7b1822	3.100	1	.078
		Q7b1922	.012	1	.914
		Q7b2022	1.902	1	.168
		Q7b2122	1.103	1	.294
		Q7b2222	.022	1	.883
		Q7a122(1)	.508	1	.476
		Q7a222(1)	3.094	1	.079
		Q7a322(1)	.185	1	.667
		Q7a422(1)	.371	1	.542
		Q7a522(1)	9.046	1	.003
		Q7a622(1)	6.240	1	.012
		Q7a722(1)	2.364	1	.124
		Q7a822(1)	.011	1	.917
		Q7a922(1)	1.056	1	.304
		Q7a1022(1)	1.056	1	.304

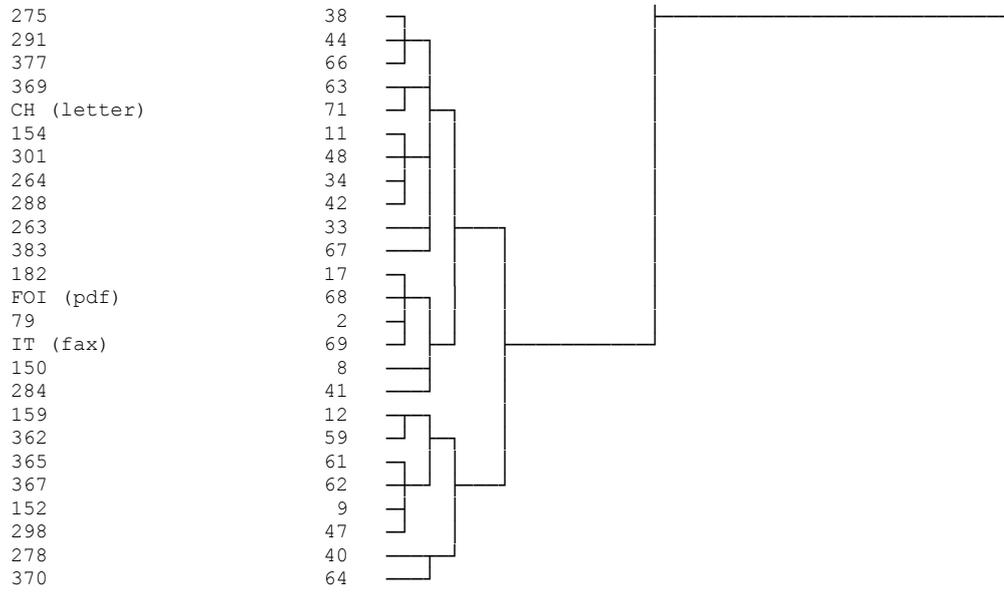
	Q7a1122(1)	.433	1	.510
	Q7a1222(1)	.042	1	.837
	Q7a1322(1)	1.026	1	.311
	Q7a1422(1)	.252	1	.616
	Q7a1522(1)	.046	1	.830
	Q7a1622(1)	.117	1	.732
	Q7a1722(1)	.308	1	.579
	Q7a1822(1)	5.129	1	.024
	Q7a1922(1)	1.114	1	.291
	Q7a2022(1)	.170	1	.680
	Q7a2122(1)	2.954	1	.086
	Q7a2222(1)	1.244	1	.265
	Overall Statistics	47.015	44	.350

Logistic regression was used to predict which variables may be indicative of the CME status. This method was chosen instead of discriminant analysis because it is less affected when the normality of the variables is not met (Hair et al., 2006), the relation between the independent variable (the CME status) and the dependant variables (the importance of the actions) is measured. The probability for the residual chi-square was calculated for the 22 actions and their importance (44 variables in total). The value of the chi-square corresponds to 47.02, with a probability of 0.35. This result (bigger than 0.05) indicates that none of the variables excluded from the model could make a significant contribution to the predictive power of the model (Field, 2005). Therefore, the addition of these variables to the model does not significantly affect its predictive power.

The only significant variable that fits the model was found with Wald's statistics with a value equal to 0.005 (significance is met when the value is lower than 0.05): the *preparation*. Hospitals located in countries with obligatory CME tend to carry out this action. This was also verified in categorical analysis, section 4.4.5.

A.9 Hierarchical Cluster Analysis: Dendrogram using Ward Method





A.10 Rotated Component Matrix

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
Voluntariness	.765											
Preparation	.734											
Comm_Behaviour	.725											
Goal Commitment	.719											
Time	.716											
NEEDS	.706											
Support	.704											
Corporate Motivation	.675											
P_Relative_Advantage	.670											
Culture	.649											
Inst_Commitment	.613											
Training	.601		.444									
CREDITS	.595	.469										
LIST	.557	.433										
Peer Communication	.531											
P_Observability	.507											
PREP_IMP		.799										
CREDS_IMP		.752										
VOL_IMP		.745										
IC_IMP		.728										
CULT_IMP		.724										
CB_IMP		.719										
LIST_IMP		.714										
CM_IMP		.661										
SUP_IMP		.617										
GC_IMP		.552										
NEED_IMP		.543										
TIME_IMP	.452	.474										
TRAIN_IMP			.804									
PC_IMP			.795									
PO_IMP			.754									
EE_IMP		.445	.633									
INC_IMP			.623									
PRA_IMP		.476	.604									
PLACE_IMP			.579						.458			

Incentives			.464									
LOCATION				.797								
EMPLOYEES				-.796								
TEACH				.705								
COMMUNITY					.799							
COMM_IMP					.788							
PU_IMP		.437				.623						
P_Usefulness	.549					.601						
EL_STATUS							.743					
DIPLOMA	.407							.704				
DIPL_IMP								.674				
Place	.466								.558			
EL_START										.813		
INSTITUTION											.731	
Experience_Expectations												.536
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 16 iterations.												

A.11 Comparison between means: non parametric tests

eCME readiness index vs. eLearning Readiness Index

The two analyzed groups are hospitals (group 0) and companies (group 1). It is possible to notice that in all cases the learning managers working for companies gave higher scores to the importance of the actions. The following table illustrates the means of all variables. Two rather close mean ranks can be observed for the *importance of creating incentives* and the importance of *setting guidelines for a correct environment*.

Ranks - eCME readiness index vs. eLearning Readiness Index

	Group	N	Mean Rank
PU_IMP	0	101	54.95
	1	54	121.12
CM_IMP	0	99	54.81
	1	54	117.69
SUP_IMP	0	100	55.42
	1	54	118.40
GC_IMP	0	100	54.22
	1	54	120.61
PREP_IMP	0	100	54.92
	1	54	119.31
TIME_IMP	0	100	59.18
	1	54	111.43
IC_IMP	0	100	55.70
	1	54	117.86
CULT_IMP	0	99	55.36
	1	54	116.68
CB_IMP	0	99	55.39
	1	54	116.61
VOL_IMP	0	100	56.08
	1	54	117.17
PC_IMP	0	100	65.54
	1	54	99.66

TRAIN_IMP	0	98	64.62
	1	54	98.06
PRA_IMP	0	98	67.90
	1	54	92.11
INC_IMP	0	100	74.02
	1	54	83.94
EE_IMP	0	97	68.01
	1	54	90.35
PO_IMP	0	98	70.30
	1	54	87.75
PLACE_IMP	0	98	75.05
	1	54	79.14
CREDS_IMP	0	95	48.00
	1	0a	.00
COMM_IMP	0	94	47.50
	1	0a	.00
LIST_IMP	0	95	48.00
	1	0a	.00
NEED_IMP	0	98	49.50
	1	0a	.00
DIPL_IMP	0	98	49.50
	1	0a	.00

Also the significance value of the tests (Mann-Whitney Test) indicates that the two groups (companies and hospitals) are significantly different, and verifies a similarity between the above mentioned variables (value > 0.05): the *importance of creating incentives* (p = 0.162) and the importance of *setting guidelines for a correct environment* (p = 0.566).

Learning managers in companies and in hospitals perceive the importance of *creating incentives* and the importance of *setting guidelines for a correct environment* similarly, however, the rest of the actions score with large differences.

For profit hospitals vs. companies

In this section, a non-parametric test is presented between for profit hospitals (group 0) and the companies (group 1). In order to run the tests all for profit hospitals of the sample were selected. Six rather close mean ranks can be observed (see following table) with the variables: *importance of the perceived relative advantage of eLearning*, *importance of creating incentives*, *importance of analysing the learners' experiences and expectations*, *importance of the perceived observability* (to try the technologies out before starting the activity) and finally *importance of setting guidelines for a correct environment*.

Ranks - for profit hospitals vs. companies

	Group	N	Mean Rank
PRA_IMP	0	15	26.53
	1	54	37.35
INC_IMP	0	15	30.90
	1	54	36.14
EE_IMP	0	15	30.60
	1	54	36.22
PO_IMP	0	15	30.03
	1	54	36.38
PLACE_IMP	0	15	32.07
	1	54	35.81

Comparing companies and for-profit hospitals it is possible to observe that 5 out of 22 variables score similarly. Also the significance test value (Mann-Whitney Test) identifies the above mentioned variables as similar in the two groups: the *importance of the perceived relative advantage of eLearning* ($p = 0.06$), the *importance of creating incentives* ($p = 0.35$), the *importance of analysing the learners' experiences and expectations* ($p = 0.32$), the *importance of the perceived observability* ($p = 0.27$) and the *importance of setting guidelines for a correct environment* ($p = 0.51$).

Mandatory vs. semi-mandatory CME (CME status)

Finally, a non parametric test was carried out between the results of countries where CME is semi-mandatory (Group 0: Switzerland and United Kingdom) and the scores of countries where CME is obligatory (Group 1: Austria, Germany, Italy and the USA). Eighteen similarities can be observed. Countries with semi-mandatory CME gave higher scores to the importance of these 18 actions.

Ranks – mandatory vs. semi-mandatory CME

	<i>Group</i>	<i>N</i>	<i>Mean Rank</i>	<i>Mann-Whitney Test</i>
PU_IMP	0	16	57.00	0.162
	1	80	46.80	
CM_IMP	0	16	56.62	0.146
	1	79	46.25	
SUP_IMP	0	16	55.81	0.266
	1	81	47.65	
PREP_IMP	0	16	59.69	0.081
	1	81	46.89	
TIME_IMP	0	16	57.81	0.150
	1	81	47.26	
CULT_IMP	0	16	51.62	0.604
	1	80	47.88	
CB_IMP	0	15	54.53	0.335
	1	81	47.38	
VOL_IMP	0	16	51.84	0.640
	1	81	48.44	
PC_IMP	0	16	44.47	.462
	1	81	49.90	
TRAIN_IMP	0	15	48.63	.918
	1	80	47.88	
PRA_IMP	0	15	49.83	0.764
	1	80	47.66	
INC_IMP	0	16	50.22	0.839
	1	81	48.76	
EE_IMP	0	15	49.87	0.696
	1	79	47.05	
PO_IMP	0	15	44.50	0.574

	1	80	48.66	
PLACE_IMP	0	15	43.57	0.470
	1	80	48.83	
COMM_IMP	0	15	46.60	0.913
	1	76	45.88	
LIST_IMP	0	15	54.03	0.212
	1	77	45.03	
DIPL_IMP	0	15	52.03	0.519
	1	80	47.24	

The significance value of the tests (Mann-Whitney value, see Table 3) indicates that the two groups gave no significantly different answers on the importance of the variables. Exceptions are the *importance of identifying the learners' needs*, the importance of specifying the *number of credits* the activity is worth, the *importance of specifying the goals the hospital wants to achieve*, and the *importance of the goal commitment*.

A.12 eLearning readiness factors - 42 elements (Succi, 2007)

1 Blended solution	
Author	Oblender, 2002
Description	The mix of learning solutions encourages eLearners with different learning styles and different learning experiences.
Indicator selected	Existence of activities in presence.
Example	A face to face meeting in the middle of the eLearning course is scheduled.

2 Communication Behaviour	
Author	Rogers, 1995
Description	Communication channels are used to promote eLearning activities among eLearners.
Indicator selected	The awareness of the learning department in the use of communication channels.
Example	There is a communication plan for each eLearning activity.

3 Corporate Motivation	
Author	Frankola, 2001
Description	The level of motivation of the organization in supporting eLearners' efforts.
Indicator selected	The declaration from the learning department about the corporate motivation.
Example	eLearning is mentioned in the corporate newsletter.

4 Culture	
Author	Veiga et al., 2001
Description	eLearning acceptance is influenced by specific cultural beliefs or tradition of a company.
Indicator selected	The presence of declared cultural enablers or impediments.
Example	Employees are used to receiving any important piece of information via the computer.

5 Dissatisfaction with the status quo	
Author	Ely, 1999
Description	The level of dissatisfaction with the current situation influences eLearners opinions about eLearning.
Indicator selected	Declaration from the learning department about eLearners perceptions.
Example	Before eLearning there were some good handbooks available in the library on a given subject.

6 Effort expectancy	
Author	Venkatesh et al., 2003
Description	ELearning activities do not seem to require too much time and energy.
Indicator selected	Effort of the learning department in explaining course requirements.
Example	Ex-alumni are available to be interviewed about their online experiences.

7 Engagement	
Author	Collis and Pals, 2000
Description	Elearners are triggered and offered good reasons to attend eLearning activities.
Indicator selected	The learning department considers elearners' motivation before offering eLearning courses.
Example	Elearners receive a special "kit" before starting eLearning activities.

8 Expectations	
Author	Inan (2004); Frankola, 2001
Description	Expectations influence the level of acceptance of an eLearning activity.
Indicator selected	The awareness of the learning department of the importance of expectations in an eLearning activity.
Example	Elearners are asked about their expectations before the eLearning experience starts.

9 Experience	
Author	Szajna, 1996; Venkatesh and Davis, 2000; Venkatesh et al. 2003
Description	Previous experience of elearners with eLearning courses affects their preparation for the next eLearning experience.
Indicator selected	The learning department keeps tracks of previous eLearning experiences of elearners.
Example	There is a track of the personal learning paths of elearners.

10 External system	
Author	Bajtelmit (1988)
Description	The external environment influence elearners experiences.
Indicator selected	Awareness of the learning department in considering this factor.
Example	A benchmark document has been produced.

11 Facilitating conditions	
Author	Venkatesh et al., 2003
Description	The physical environment facilitates eLearning activities.
Indicator selected	The effort of the learning department in creating facilitating conditions.
Example	The training room is closed to the cafeteria.

12 Felt needs/problems	
Author	Rogers (1995)
Description	eLearning activities can meet needs and problems felt by the eLearners.
Indicator selected	eLearning solves some problems present in the organization or answers to specific learning needs that could not find a different modality.
Example	The nature of the learning project requires to train thousands of employees in the same week.

13 Goal Commitment	
Author	Tinto, 1975
Description	Learners know and understand goals of the organization.
Indicator selected	Effort of the learning department in communicating the eLearning activities' goals.
Example	The improvement of a skill for an eLearner is an important goal for her/himself.

14 Image	
Author	Venkatesh and Davis, 2000
Description	The audience of eLearning activities create an image of the eLearning modality within the organization.
Indicator selected	Target range.
Example	eLearning courses are addressed to every role in the organization.

15 Incentives	
Author	Wolski and Jackson , 1999
Description	Learning departments associate incentive systems to eLearning activities.
Indicator selected	The presence of any incentives.
Example	eLearners win a mug each time they finish a course.

16 Institutional Commitment	
Author	Tinto , 1975, Ely , 1999
Description	ELearners are committed with institutional goals.
Indicator selected	Declarations of top-managers about eLearning at an institutional level.
Example	The presentation of the company is done through an online course.

17 Job relevance	
Author	Venkatesh and Davis 2000
Description	eLearning activities are perceived as strongly related to job activities.
Indicator selected	Effort of the learning department in showing the correlation between eLearning and job activities.
Example	An English online course is proposed because it is necessary to speak with international suppliers.

18 Managerial oversight	
Author	Frankola 2001; ASTD and Masie 2001
Description	The involvement of the management helps the learning department in promoting eLearning activities.
Indicator selected	The presence of any form of participation of management or top management.
Example	A videoconference with the CEO launches the eLearning program.

19 Marketing	
Author	ASTD and Masie 2001
Description	The effective participation of eLearners is enhanced by internal sponsoring activities.
Indicator selected	The presence of marketing plans and tools.
Example	Gadgets connected to the eLearning course are distributed at the beginning of the course.

20 Norms of the Social System	
Author	Rogers (1995)
Description	Specific norms are created to facilitate the introduction of eLearning as a learning modality.
Indicator selected	The presence of norms facilitating eLearning activities.
Example	Discussion sessions with peers about learning results and questions are scheduled every two weeks.

21 Output quality	
Author	Venkatesh and Davis 2000
Description	E Learners perceive a quality output on their job from eLearning activities.
Indicator selected	Effort of the learning department in showing the output quality.
Example	E Learners achieve an international certificate for a foreign language.

22 Peer communication	
Author	Fuller 2000; Rogers , 1995
Description	The creation of peer communication channels helps eLearners in understanding eLearning activities.
Indicator selected	Presence of official peer-to-peer communication tools.
Example	In each location there is an internal champion who takes care of eLearning activities.

23 Perceived Compatibility	
Author	Rogers (1995)
Description	All organization's processes, practices and values can be perceived by eLearners as compatible with the eLearning process.
Indicator selected	There are evident signs of incompatibility.
Example	The eLearning system is integrated in the corporate intranet.

24 Perceived Complexity	
Author	Rogers (1995)
Description	E Learning activities do not seem to require new complex skills for eLearners.
Indicator selected	E Learners are informed and prepared about required skills.
Example	Steps to access eLearning activities are communicated.

25 Perceived Observability	
Author	Rogers (1995)
Description	E Learning activities are observable by eLearners.
Indicator selected	Possibility for eLearners to access the course before starting the activities.
Example	There is a pre-course meeting where tools and activities are presented.

26 Perceived Relative Advantage	
Author	Rogers (1995)
Description	Elearners can compare eLearning as an effective and efficient solution with previous training solutions.
Indicator selected	The learning department promotes the awareness of the relative advantage of eLearning.
Example	The cost effectiveness of eLearning increases the number of learning activities in the organizations.

27 Perceived Trialability	
Author	Rogers (1995)
Description	Elearning tools can be tried by elearners.
Indicator selected	Possibility for elearners to access the course before starting the activities.
Example	There is a pre-course meeting where tools and activities are presented.

28 Perceived Usefulness	
Author	Davis <i>et al.</i> , 1989
Description	The perception of elearners of the usefulness of elearning activities affects their acceptance.
Indicator selected	The effort of the learning department in showing the benefits of elearning.
Example	Expected job performance improvements are communicated.

29 Performance expectancy	
Author	Venkatesh <i>et al.</i> 2003
Description	Elearning activities do not seem to require new complex skills for elearners (cfr. 3).
Indicator selected	The presence of support for elearners where elearning activities require skills not already acquired by elearners.
Example	An help desk is guaranteed during the course.

30 Performance Review	
Author	ASTD and Masie 2001
Description	The perception of being monitored enhances the intention of finishing the elearning course.
Indicator selected	Presence of any declaration of performance review.
Example	At the end of the month a report is sent to elearners.

31 Place	
Author	ASTD and Masie 2001
Description	The creation of the correct physical conditions helps elearners in attending an elearning activity.
Indicator selected	Presence of policies regarding the space issue.
Example	A training room is created in each location of the organization.

32 Preparation	
Author	Prendergast, 2003; Arsham 2002; Lynch 2001; ASTD and Masie 2001
Description	Elearners are prepared and introduced to eLearning activities.
Indicator selected	Presence of any preparation session or moment.
Example	An introductory session in presence is scheduled at the beginning of eLearning activities.

33 Result demonstrability	
Author	Venkatesh and Davis 2000
Description	Elearners perceive they can demonstrate results once they finish the course.
Indicator selected	Effort of the learning department in showing the result demonstrability.
Example	At the end of the activity elearners will be able to analyse a different balance.

34 Rewards	
Author	Frankola 2001; Ely , 1999
Description	Forms of reward encourage elearners in the intention of finishing the course.
Indicator selected	Presence of a reward system
Example	There is a bonus of 50\$ for any course completion.

35 Social influence	
Author	Venkatesh <i>et al.</i> 2003
Description	The influence of peers affects opinions and expectations about eLearning.
Indicator selected	The awareness of the learning department about social influence.
Example	Elearners' results are public.

36 Social integration	
Author	Tinto , 1975; Inan (2004)
Description	Elearners experiment a social environment as in a classroom context. Social integration affects eLearning acceptance.
Indicator selected	The presence of collaborative activities in eLearning activities.
Example	It is possible to collaborate in presence or online with other peers attending the same course.

37 Subjective norm	
Author	Venkatesh and Davis 2000
Description	The opinion and involvement of supervisors influence eLearner decisions.
Indicator selected	The degree of involvement of the management.
Example	Managers are supposed to spend two minutes per week discussing eLearning results with eLearners.

38 Support	
Author	Prendergast (2003)
Description	The creation of a support system encourages eLearners in starting an eLearning activity.
Indicator selected	The presence of support structures or tools.
Example	A group of tutors assist eLearners during working hours.

39 Target choice	
Author	Masie 2002
Description	eLearning activities can be addressed to a specific or a generic public. Uncertainty regarding the target choice affects eLearning acceptance.
Indicator selected	A rationale to select the target each time.
Example	A course is offered only to administrative employees.

40 Time	
Author	Rekkedal , 1972; Frankola 2001; Ely , 1999
Description	Time available could help eLearners in following their learning path.
Indicator selected	Presence of any policy regarding the time issue.
Example	Time slots are allocated every week for eLearning activities.

41 Training	
Author	Wolski and Jackson , 1999
Description	Different skills to become an eLearner can be taught.
Indicator selected	Effort of the learning department in teaching required skills for an eLearning activity.
Example	Independent study method tips are provided to eLearners.

42 Voluntariness	
Author	Venkatesh and Davis 2000; Venkatesh <i>et al.</i> 2003; ASTD and Masie 2001;
Description	The level of voluntariness influences eLearners perception of an eLearning activity and their study organization.
Indicator selected	Specification of the level of voluntariness.
Example	Course participation is tracked and assessed.

Acronyms

ACCME	Accreditation Council for Continuing Medical Education
ASTD	American Society for Training and Development
CD	Compact Disc
CEDEFOP	European Centre for the Development of Vocational Training
CeLeRI	Corporate eLearning Readiness Index
CME	Continuing Medical Education
CNFMC	Conseils Nationaux de la Formation Médicale Continue
DNS	Domain Name Systems
DVD	Digital Versatile Disc / Digital Video Disc
EACCME	European Accreditation Council for Continuing Medical Education
eCME	Electronic Continuing Medical Education
eCMERI	Electronic Continuing Medical Education Readiness Index
EFTA	European Free Trade Association
eFMC	Formation Médicale Continue sur Internet
EU	European Union
FAD	Formazione A Distanza (Distance Education)
ICT	Information and Communication Technology
IS	Information System
LAN	Local Area Network
Max	Maximum
MELD	MedBiquitous E-Learning Discourse
Min	Minimum
N	Number
OECD	Organization for Economic Co-operation and Development
PDF	Portable Document Format

SMS	Short Message Service
Std. Dev.	Standard Deviation
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
UEMS	European Union of Medical Specialists
UNAFORMEC	Union Nationale des Associations de Formation Médicale et d'Evaluation Continues
WAN	Wide Area Network

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Medline medline.cos.com

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